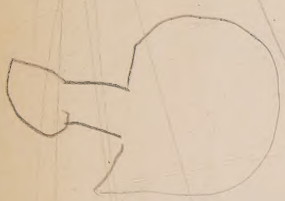
MODERN LIFE ARITHMETICS

BOOK TWO

FOWLKES & GOFF



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THE MODERN LIFE ARITHMETICS

BOOK TWO

BY

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New York
THE MACMILLAN COMPANY
1929

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Set up and electrotyped. Published October, 1928.
Reprinted January, 1929; March, 1929;
July, 1929.

Printed in the United States of America

To Teachers Who Use This Book:

This is Book Two of a series of three books which constitute a "Modern Life Arithmetic" curriculum. Parts One and Two of this volume include material usually studied in the fifth grade, while Parts Three and Four present material usually studied in the sixth grade. In examining this book, will you please note the following:

1. Children learn by reading only if they can understand what they read. This book is written in terms which the child easily understands. Not only does this book conform to vocabulary studies of isolated words, but great attention has been given to sentence and paragraph structure. Many of the problems have been taken directly from the daily conversation of children.

2. An attempt has been made to introduce all arithmetical principles through means of natural social situations. Also, useless and artificial material has been omitted.

3. Great care has been taken with the abstract material in this volume.

(*a*) It is complete as to number combinations.

(*b*) It has been developed in order of learning difficulty.

(*c*) The development of common fractions has been done by steps of learning difficulty. Practice in common fractions has been limited

largely to those fractions appearing in daily life.

(*d*) The work in decimal fractions is presented in terms of use rather than theory.

4. By means of very thorough and exhaustive chapter reviews, coupled with a self-diagnostic technique addressed directly to the pupil, practical provision is made for individual differences.

5. Proving all computation is stressed throughout.

6. Care has been taken to use the special arithmetical terms in their natural setting.

7. Particular emphasis has been given to the correlation of arithmetic with all subjects and life in general. The wealth of civic and character situations stressed throughout the book is proof of this.

8. An unusually large amount of illustrative material that is really a part of the text has been included.

9. Generous use has been made of the project form of organization, and at the same time guidance has been provided toward the important elements in the material at hand.

10. The problems contain number combinations which have been carefully selected with relation to drill needs.

This material has been used in experimental editions in some twenty states. It has been criticized page for page by hundreds of administrative officers, teachers, and children.

The authors wish to make grateful acknowledgment to the many administrative officers, teachers, and children who have rendered valuable help in refining the material before it was published in this form. This

group is unnamed here only because lack of space will not allow it. Special acknowledgment is due Dr. E. R. Hedrick, of the University of California at Los Angeles, for his services as general editor of this series. Acknowledgment is also due Dr. W. S. Taylor, Dean of the School of Education, University of Kentucky; Dr. W. W. Wright, Associate Professor of Education, Indiana University; and Irene Sauble, of the Detroit Public Schools, for their many criticisms and suggestions. To Ann Harris goes great credit for much of the statistical and clerical work involved in the development of the material in both experimental form and final edition.

John Guy Fowlkes
Thomas Theodore Goff

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BOOK TWO

PART ONE

CHAPTER I

Finding Out What You Have Learned

You are now beginning the study of fifth-grade arithmetic. Whether you do good work or not in this grade depends somewhat upon how well you remember what you learned in the fourth grade. Some review exercises follow which contain many of the important facts in arithmetic that you should know. See if you can answer all the questions and work all the examples and problems without an error. If there are some questions you cannot answer or if there are some examples or problems you cannot work, get your teacher to give you some work that will keep you from making the same mistakes again.

Practice Test in Addition

Add, and write the sums on a folded paper. Time, 8 minutes.

	1.	2.	3.	4.	5.	6.
(A)						4
		4				5
	5	0				7
	2	7	61	37	68	2
	7	5	28	45	32	8

	1.	2.	3.	4.	5.	6.
(B)		40		18	98	
	265	23	342	36	37	427
	32	16	615	43	86	308
(C)			21	49	89	
	20	18	10	7	75	
	32	37	5	32	64	130
	4	19	40	6	35	205
	23	16	3	14	93	413
(D)						37,815
					4237	21,695
	126	591	397	895	6593	32,874
	317	183	165	687	8476	95,067
	209	124	248	573	9125	38,492

Practice Test in Subtraction

Subtract, and write the differences on a folded paper. Time, 15 minutes.

	1.	2.	3.	4.	5.	6.
(A)	76	71	139	592	1033	1004
	30	26	105	367	246	432

	1.	2.	3.	4.	5.	6.
(B)	279	591	935	1062	376	618
	51	57	52	73	5	9
(C)	8579	4582	6638	5379	2656	4290
	7653	4105	3041	3978	2479	1607
(D)	8528	10,244	4829	1301	5748	8503
	1694	6,975	207	205	193	903
(E)	6815	9057	3676	10,320	1461	3133
	458	908	696	841	40	18
(F)	4368	1304	5097	7691	51,720	1120
	88	98	2	8	16,728	432

General Review

1. Read the number of this automobile license:

2. The population of New York City, in 1920, was five million, six hundred twenty thousand, forty-eight. Write this number in figures.

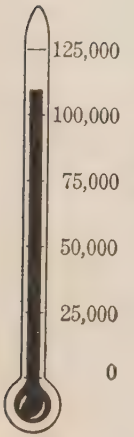
3. What is the time on this clock?

4. Write the number 39 as a Roman number.

5. How many quarters are there in $5?

6. Divide 7546 by 8 by short division.

7. The Citizens' Committee is conducting a building campaign to raise $125,000 for a new building. As the money is subscribed, the total is shown on a large thermometer placed where everybody can see it easily. About how much has been subscribed? About how much is still to be raised?



8. What is meant by $3\frac{1}{2}''$?

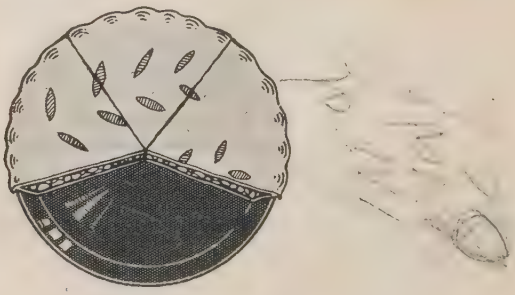
9. Read these fractions: $\frac{3}{4}$, $\frac{1}{2}$, $\frac{7}{8}$, $\frac{5}{6}$.

10. Which is more, $\frac{1}{8}$ or $\frac{1}{4}$?

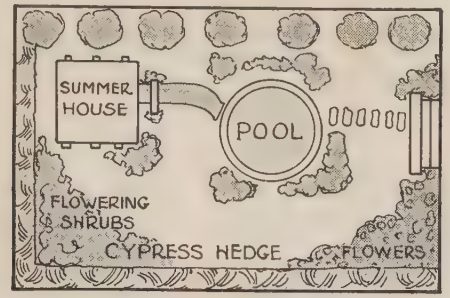
11. Divide 448 by 32 by long division.

12. What is a fraction?

13. What part of this pie has been taken away? What part of this pie remains?



14. If, in the picture of the garden given here, $\frac{1}{8}$ of an inch represents 5 feet, how many feet long is the garden? How many feet wide is the garden?



15. What is meant by "perimeter"?
16. How many feet are there in 1 mile?
17. What is the sum of $\frac{5}{8}$ and $\frac{3}{8}$?
18. How many square rods are there in 1 acre?
19. What is a square inch? A square foot?

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20. In the above road map, if 1 in. = 40 mi., about how many miles is it from Austin, Texas, to Houston, Texas?

Practice Test in Multiplication

Multiply, and write the products on a folded paper. Time, 10 minutes.

	1.	2.	3.	4.	5.	6.
(A)	34	69	132	219	137	598
	2	3	2	3	7	9
(B)	72	22	47	92	97	502
	12	43	20	76	83	13
(C)	428	143	475	975	532	4253
	32	212	264	304	300	57

Practice Test in Short Division

Divide by short division, and write the quotients on a folded paper. Time, 8 minutes.

	1.	2.	3.
(A)	$6\overline{)9,563,082}$	$2\overline{)9532}$	$8\overline{)623,632}$
(B)	$5\overline{)944,280}$	$9\overline{)9,453,654}$	$3\overline{)928,602}$
(C)	$8\overline{)3,156,424}$	$6\overline{)4,968,210}$	$7\overline{)838,425}$
(D)	$2\overline{)8380}$	$7\overline{)247,905}$	$5\overline{)889,645}$
(E)	$3\overline{)893,235}$	$8\overline{)847,096}$	$6\overline{)6,471,984}$
(F)	$9\overline{)68,098,905}$	$5\overline{)748,410}$	$7\overline{)562,261}$

Practice Test in Long Division

Copy, and divide by long division. Time, 16 minutes.

	1.	2.	3.	4.
(A)	$21\overline{)84}$	$24\overline{)49}$	$72\overline{)216}$	$53\overline{)128}$
(B)	$25\overline{)200}$	$29\overline{)87}$	$13\overline{)91}$	$27\overline{)89}$
(C)	$32\overline{)76}$	$32\overline{)128}$	$71\overline{)4828}$	$53\overline{)5090}$
(D)	$31\overline{)4960}$	$712\overline{)356{,}000}$	$528\overline{)161{,}568}$	$541\overline{)109{,}823}$

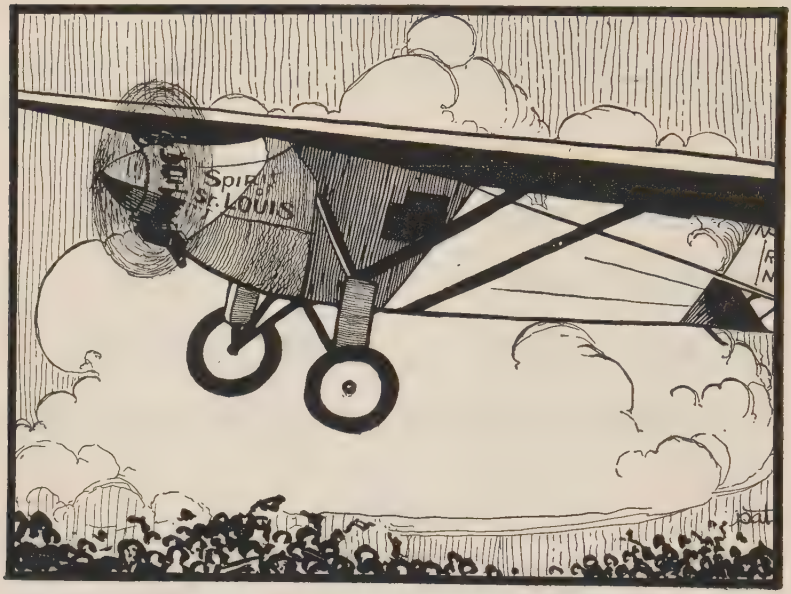
Problems

1. George bought a sled for \$3.75 and gave the merchant a \$10 bill in payment. Name the pieces of money George should have received in change.

2. The weights of the eleven men on a football team are: Left end, 148 lb.; left tackle, 158 lb.; left guard, 165 lb.; center, 170 lb.; right guard, 160 lb.; right tackle, 162 lb.; right end, 151 lb.; quarterback, 145 lb.; left halfback, 148 lb.; right halfback, 152 lb.; and fullback, 157 lb. What is the average weight of the men on the team?

3. Mr. Brown sold 305 bushels of wheat at \$1.35 a bushel and spent \$218.75 of the money for some farm implements. How much money did Mr. Brown have left from the sale of his wheat?

4. Lindbergh started from New York to cross the Atlantic on Friday, May 21, at 7:52 A.M., Eastern Standard Time, and arrived in Paris on Saturday,



May 22, at 5:24 P.M., Eastern Standard Time. How many hours and minutes was he in making the trip?

5. One day at school Henry said, "Choose any number, multiply it by 2, add 30, divide by 2, subtract the first number, and you will have 15." Was this right?

Practice Test in Long Division

Copy, and divide by long division. Time, 12 minutes.

	1.	2.	3.	4.
(A)	$46\overline{)92}$	$34\overline{)81}$	$29\overline{)116}$	$28\overline{)225}$
(B)	$19\overline{)97}$	$13\overline{)128}$	$29\overline{)198}$	$32\overline{)768}$
(C)	$32\overline{)640}$	$41\overline{)2053}$	$92\overline{)36{,}984}$	$43\overline{)8624}$

Review of United States Money

Add, subtract, multiply, or divide as indicated and write the answers on a folded paper.

	1.	2.	3.	4.
(A)	Multiply: \$329 4	Add: \$575 293	Divide: 7)\$147	Subtract: \$5.00 1.93
(B)	Divide: 5)\$8.75	Divide: \$5)\$35	Add: \$2.93 .65 8.10	Multiply: \$3.46 × 7
(C)	Subtract: \$284 175	Multiply: \$3.75 5	Divide: \$2.79 ÷ 9	Add: 79¢ 5¢ 12¢
(D)	Divide: \$85 ÷ 5	Divide: \$40 ÷ \$8	Multiply: 4 × \$2.75	Divide: 4)\$3.00

CHAPTER II

Adding and Subtracting Fractions

Review of Fractions

1. If a pie is cut into 2 equal parts, what is 1 of the parts called?

2. If you fold a sheet of paper into 4 equal parts, what is 1 of the equal parts called? What are 3 of the parts called? What are 4 of the parts called?

3. How many halves are there in a cake? In a pie? In an orange? In an inch? In a day? In anything?

4. How many thirds are there in a circle? In an apple? In a foot? In a month? In a yard? In anything?

5. How many fourths are there in a square? In a bushel? In an inch? In a pound? In a gallon? In anything?

6. How many fifths are there in anything? How many sixths? How many tenths? How many twelfths? How many sixteenths? How many hundredths?
7. How many inches are there in 1 foot?
8. What part of 1 foot is 1 inch?
9. What part of 1 foot is 5 inches?
10. What part of 1 foot is 7 inches?
11. What part of 1 foot is 11 inches?
12. How many ounces are there in 1 pound?
13. What part of 1 pound is 1 ounce?
14. What part of 1 pound is 5 ounces?
15. What part of 1 pound is 15 ounces?
16. How many months are there in 1 year?
17. What part of 1 year is 1 month?
18. What part of 1 year is 7 months?
19. What part of 1 year is 5 months?
20. What are numbers like $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, and $\frac{5}{8}$ called?

Practice in Reading Fractions

Read these fractions:

1. $\frac{1}{8}$
2. $\frac{1}{6}$
3. $\frac{1}{4}$
4. $\frac{4}{5}$
5. $\frac{5}{8}$
6. $\frac{1}{3}$
7. $\frac{7}{12}$
8. $\frac{3}{4}$
9. $\frac{3}{5}$
10. $\frac{7}{16}$
11. $\frac{2}{3}$
12. $\frac{1}{2}$
13. $\frac{3}{8}$
14. $\frac{1}{5}$
15. $\frac{11}{12}$
16. $\frac{5}{6}$
17. $\frac{1}{12}$
18. $\frac{2}{5}$
19. $\frac{7}{8}$
20. $\frac{13}{20}$

Practice in Writing Fractions

Write in figures:

1. One-eighth
2. Five-sixths
3. Three-fourths
4. Two-thirds
5. Five-eighths
6. One-half
7. Two-fifths
8. One-twelfth
9. Four-fifths
10. Five-sixteenths
11. One-third
12. Three-eighths
13. One-sixth
14. One-fourth
15. Five-twelfths
16. One-fifth
17. Seven-eighths
18. Three-fifths
19. Seven-twelfths
20. Eleven-twentieths

The Terms of a Fraction

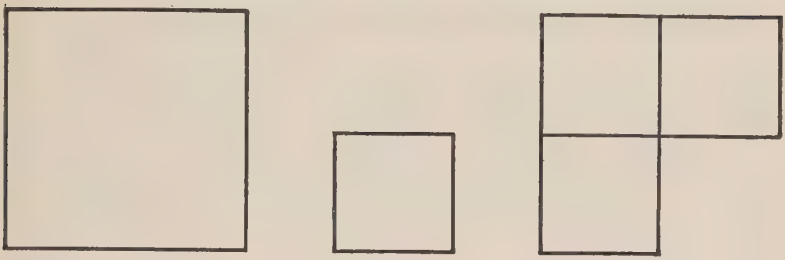
In a number like $\frac{3}{5}$, what is the 3 called?
In a number like $\frac{3}{5}$, what is the 5 called?

The number above the line in a fraction, you remember, is called the numerator, and the number below the line in a fraction is called the denominator. In the fraction $\frac{3}{5}$, 3 is the numerator and 5 is the denominator.

> The numerator and denominator of a fraction are called the **terms** of that fraction.

What are the terms of the following fractions: $\frac{3}{8}$, $\frac{7}{9}$, $\frac{10}{11}$?
What are the terms of any fraction?

What the Terms of a Fraction Tell Us



A B C

What part of figure A is figure B?

What part of figure A is figure C?

In the fraction $\frac{3}{4}$, what does the 4 tell you?

In the fraction $\frac{3}{4}$, what does the 3 tell you?

Do you see that, in the fraction $\frac{3}{4}$, the 4 tells you that something has been divided into 4 equal parts?

Do you see that the 3 tells how many of these equal parts have been taken or are being used?

In the same way, in the fraction $\frac{2}{3}$, the denominator shows that something has been divided into 3 equal parts, and the 2 shows that 2 of the 3 equal parts have been taken or are being used.

> The denominator of a fraction shows into how many equal parts something has been divided.
>
> The numerator of a fraction shows how many equal parts have been taken or used.

What does $\frac{1}{2}$ show you? What does $\frac{3}{5}$ show you?

Practice in Adding Fractions

Add, and write the sums on a folded paper.

	1.	2.	3.	4.	5.
(A)	$\frac{1}{3}$ $\frac{1}{3}$	$\frac{1}{5}$ $\frac{1}{5}$	$\frac{1}{9}$ $\frac{1}{9}$	$\frac{1}{5}$ $\frac{2}{5}$	$\frac{4}{15}$ $\frac{7}{15}$ $\frac{2}{15}$
(B)	$\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$	$\frac{1}{9}$ $\frac{2}{9}$ $\frac{2}{9}$	$\frac{1}{8}$ $\frac{3}{8}$ $\frac{3}{8}$	$\frac{1}{6}$ $\frac{3}{6}$ $\frac{1}{6}$	$\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$
(C)	$\frac{3}{10}$ $\frac{1}{10}$ $\frac{5}{10}$	$\frac{5}{12}$ $\frac{1}{12}$ $\frac{5}{12}$	$\frac{3}{16}$ $\frac{5}{16}$ $\frac{3}{16}$	$\frac{2}{7}$ $\frac{1}{7}$ $\frac{3}{7}$	$\frac{2}{5}$ $\frac{1}{5}$ $\frac{1}{5}$

Problems

1. Henry and his father did truck gardening this year. They planted $\frac{3}{8}$ of an acre in beans, $\frac{1}{8}$ of an acre in onions, and $\frac{3}{8}$ of an acre in tomatoes. How much land did they plant in these three crops?

2. Mrs. Stevens bought $\frac{1}{4}$ pound of one kind of cheese and $\frac{1}{4}$ pound of another kind of cheese. How much did this cheese weigh all together?

3. The fifth grade in the James Madison School spends $\frac{1}{7}$ of the school time on arithmetic, $\frac{1}{7}$ on geography, and $\frac{3}{7}$ on English, reading, writing, and spelling. What part of the school time is spent on all six of these studies together?

4. It is $\frac{3}{10}$ of a mile from my house to the entrance of the park and $\frac{7}{10}$ of a mile from the entrance to the back of the park. How far is it from my house to the back of the park?

5. Jane and Tom went fishing. They caught one fish that weighed $\frac{7}{16}$ of a pound, another that weighed $\frac{3}{16}$ of a pound, and a third that weighed $\frac{5}{16}$ of a pound. How much did the three fish weigh together?

Meaning of Common Denominator

In the examples and problems you have just worked, the denominators in each were alike. For that reason, these examples and problems were easy because all you had to do was to add the numerators. But how will you add fractions that do not have the same denominator? How can you add $\frac{1}{4}$ and $\frac{1}{2}$? You cannot add any fractions until they have the same denominator. Then you cannot add $\frac{1}{4}$ and $\frac{1}{2}$ until they have the same, or a common, denominator.

> When two or more fractions have the same denominator, they are said to have a **common denominator.**

Changing the Form of Fractions by Multiplying

Add $\frac{1}{4}$ and $\frac{1}{2}$.

$$\begin{aligned} \tfrac{1}{4} &= \tfrac{1}{4} \\ \tfrac{1}{2} &= \tfrac{2}{4} \\ &\overline{\tfrac{3}{4}} \end{aligned}$$

You have just learned that you cannot add fractions unless they have the same denominator. Sometimes when you have fractions to add, one of the

fractions has a denominator that will do for both fractions. That is, sometimes the denominator of one of the fractions is the common denominator of the fractions you are adding. When you are adding fractions, you should always look at all the denominators to see if one of them will do for a common denominator. Here is a rule that tells you how to see if one of the denominators is a common denominator for the fractions you are adding.

> In adding fractions, if one of the denominators can be divided with no remainder by each of the other denominators, then the denominator that can be divided evenly by the other denominators is the common denominator of the fractions you are adding.

In adding $\frac{1}{8}$ and $\frac{1}{2}$, 8 can be divided evenly by 2; so 8 is the common denominator of $\frac{1}{2}$ and $\frac{1}{8}$. In adding $\frac{1}{4} + \frac{1}{4} + \frac{1}{16}$, 16 can be divided by 4; so 16 is the common denominator of $\frac{1}{4}$ and $\frac{1}{16}$.

In adding $\frac{1}{4}$ and $\frac{1}{2}$, 4 can be divided evenly by 2; so you know 4 is the common denominator. But you still have to change $\frac{1}{2}$ to fourths without changing the value of $\frac{1}{2}$. Here is the way you can do it. Both the numerator and the denominator of $\frac{1}{2}$ can be multiplied by 2. You found that 4 was the common denominator of $\frac{1}{4}$ and $\frac{1}{2}$. You know that 2 will go into 4 two times. Then,

$$\begin{array}{rl} \frac{1}{4} & = \frac{1}{4} \\ \frac{1}{2} = \frac{1 \times 2}{2 \times 2} & = \frac{2}{4} \\ & \overline{\frac{3}{4}} \end{array}$$

to change $\frac{1}{2}$ to fourths, you must multiply both the numerator and denominator of $\frac{1}{2}$ by 2.

When you multiply both terms of a fraction by the same number, you change the form but not the value of that fraction.

You will often need to know how to change the form of a fraction. You may need to change $\frac{1}{2}$ to fourths or $\frac{1}{2}$ to eighths or change other fractions without changing their values. Here is a rule that will help you in changing the form of a fraction without changing its value.

One way to change the form of a fraction without changing its value is to multiply both terms of the fraction by the same number.

$$\frac{1}{2} = \frac{1 \times 2}{2 \times 2} = \frac{2}{4}$$

When both terms of a fraction have been multiplied by the same number, the fraction is said to have been changed to higher terms. $\frac{1 \times 4}{2 \times 4} = \frac{4}{8}$. When you multiply both terms of a fraction by the same number, you make the terms of the fraction larger numbers.

Practice in Changing the Form of Fractions

Write the numbers of the examples given below and after the number of each example write the missing numerator. If you do not know the missing numerator, use the rule for changing the form of a fraction without changing its value.

1. $\frac{1}{2} = \frac{\quad}{4}$
2. $\frac{1}{3} = \frac{\quad}{6}$
3. $\frac{1}{5} = \frac{\quad}{15}$
4. $\frac{1}{4} = \frac{\quad}{12}$
5. $\frac{1}{6} = \frac{\quad}{18}$
6. $\frac{1}{7} = \frac{\quad}{14}$
7. $\frac{2}{3} = \frac{\quad}{9}$
8. $\frac{3}{8} = \frac{\quad}{24}$
9. $\frac{1}{8} = \frac{\quad}{16}$
10. $\frac{4}{5} = \frac{\quad}{15}$
11. $\frac{3}{7} = \frac{\quad}{14}$
12. $\frac{2}{5} = \frac{\quad}{10}$
13. $\frac{3}{4} = \frac{\quad}{12}$
14. $\frac{1}{2} = \frac{\quad}{8}$
15. $\frac{1}{3} = \frac{\quad}{9}$
16. $\frac{5}{8} = \frac{\quad}{16}$
17. $\frac{3}{4} = \frac{\quad}{8}$
18. $\frac{2}{3} = \frac{\quad}{6}$
19. $\frac{3}{5} = \frac{\quad}{10}$
20. $\frac{1}{4} = \frac{\quad}{16}$
21. $\frac{3}{8} = \frac{\quad}{16}$
22. $\frac{1}{4} = \frac{\quad}{8}$
23. $\frac{5}{7} = \frac{\quad}{14}$
24. $\frac{1}{2} = \frac{\quad}{6}$
25. $\frac{1}{5} = \frac{\quad}{10}$
26. $\frac{4}{5} = \frac{\quad}{10}$
27. $\frac{1}{8} = \frac{\quad}{24}$
28. $\frac{1}{3} = \frac{\quad}{18}$
29. $\frac{4}{7} = \frac{\quad}{14}$
30. $\frac{1}{3} = \frac{\quad}{21}$
31. $\frac{1}{3} = \frac{\quad}{12}$
32. $\frac{1}{5} = \frac{\quad}{20}$

What numbers should go in the blanks below?

33. $\frac{1 \times}{2 \times} = \frac{5}{10}$
34. $\frac{1 \times}{3 \times} = \frac{5}{15}$
35. $\frac{2 \times}{3 \times} = \frac{8}{12}$
36. $\frac{6 \times}{7 \times} = \frac{12}{14}$
37. $\frac{1 \times}{2 \times} = \frac{3}{6}$
38. $\frac{3 \times}{5 \times} = \frac{9}{15}$

Practice in Adding Fractions

Add, and write the sums on a folded paper. Remember that you cannot add fractions unless they have a common denominator. Here is one of these examples added so that you will know how to work the others.

$$\frac{2}{3} = \frac{2 \times 3}{3 \times 3} = \frac{6}{9}$$
$$\underline{\frac{2}{9}} \qquad = \frac{2}{9}$$
$$\frac{8}{9}$$

	1.	2.	3.	4.	5.	6.	7.	8.
(A)	$\frac{1}{4}$ + $\frac{1}{2}$	$\frac{1}{8}$ + $\frac{1}{4}$	$\frac{3}{4}$ + $\frac{1}{8}$	$\frac{1}{4}$ + $\frac{3}{8}$	$\frac{5}{8}$ + $\frac{1}{4}$	$\frac{2}{3}$ + $\frac{1}{6}$	$\frac{1}{3}$ + $\frac{1}{9}$	$\frac{2}{3}$ + $\frac{2}{9}$
(B)	$\frac{3}{5}$ + $\frac{3}{10}$	$\frac{1}{6}$ + $\frac{5}{12}$	$\frac{3}{14}$ + $\frac{1}{7}$	$\frac{5}{16}$ + $\frac{1}{4}$	$\frac{2}{3}$ + $\frac{5}{21}$	$\frac{5}{18}$ + $\frac{1}{9}$	$\frac{1}{15}$ + $\frac{2}{3}$	$\frac{5}{24}$ + $\frac{3}{4}$

Problems

1. Jack had to hoe a potato patch. He hoed $\frac{1}{8}$ of the patch on Monday after school, $\frac{1}{4}$ of the patch on

Tuesday, and $\frac{1}{8}$ of the patch on Wednesday. How much of the potato patch had he hoed when he finished his work on Wednesday?

2. Mary's uncle lives in the country. He owns a farm that is $\frac{1}{8}$ of a mile wide and $\frac{1}{4}$ of a mile long. What is the perimeter of the farm?

Practice in Changing the Form of Fractions

Write the numbers of the examples given below and after the number of each example write the missing numerator. If you do not know the missing numerators, use the rule for changing the form of a fraction without changing its value.

1. $\frac{1}{2} = \frac{\quad}{16}$	12. $\frac{2}{5} = \frac{\quad}{20}$	23. $\frac{3}{7} = \frac{\quad}{21}$	34. $\frac{3}{4} = \frac{\quad}{20}$
2. $\frac{1}{5} = \frac{\quad}{30}$	13. $\frac{3}{8} = \frac{\quad}{32}$	24. $\frac{1}{2} = \frac{\quad}{32}$	35. $\frac{4}{7} = \frac{\quad}{21}$
3. $\frac{2}{3} = \frac{\quad}{15}$	14. $\frac{1}{6} = \frac{\quad}{24}$	25. $\frac{1}{4} = \frac{\quad}{24}$	36. $\frac{3}{5} = \frac{\quad}{20}$
4. $\frac{3}{4} = \frac{\quad}{16}$	15. $\frac{1}{2} = \frac{\quad}{20}$	26. $\frac{2}{5} = \frac{\quad}{25}$	37. $\frac{2}{3} = \frac{\quad}{21}$
5. $\frac{5}{8} = \frac{\quad}{32}$	16. $\frac{4}{5} = \frac{\quad}{25}$	27. $\frac{2}{7} = \frac{\quad}{21}$	38. $\frac{1}{2} = \frac{\quad}{22}$
6. $\frac{5}{6} = \frac{\quad}{24}$	17. $\frac{5}{8} = \frac{\quad}{24}$	28. $\frac{1}{3} = \frac{\quad}{24}$	39. $\frac{5}{7} = \frac{\quad}{21}$
7. $\frac{1}{4} = \frac{\quad}{20}$	18. $\frac{2}{3} = \frac{\quad}{24}$	29. $\frac{1}{6} = \frac{\quad}{30}$	40. $\frac{5}{6} = \frac{\quad}{30}$
8. $\frac{2}{5} = \frac{\quad}{30}$	19. $\frac{5}{6} = \frac{\quad}{18}$	30. $\frac{3}{5} = \frac{\quad}{30}$	41. $\frac{4}{5} = \frac{\quad}{20}$
9. $\frac{1}{8} = \frac{\quad}{32}$	20. $\frac{1}{7} = \frac{\quad}{21}$	31. $\frac{1}{4} = \frac{\quad}{32}$	42. $\frac{2}{3} = \frac{\quad}{18}$
10. $\frac{3}{5} = \frac{\quad}{25}$	21. $\frac{1}{2} = \frac{\quad}{12}$	32. $\frac{1}{2} = \frac{\quad}{24}$	43. $\frac{3}{4} = \frac{\quad}{24}$
11. $\frac{6}{7} = \frac{\quad}{21}$	22. $\frac{3}{4} = \frac{\quad}{32}$	33. $\frac{1}{5} = \frac{\quad}{25}$	44. $\frac{4}{5} = \frac{\quad}{30}$

Practice in Adding Fractions

Add the fractions on page 23 and write the sums on a folded paper. Remember that you cannot add fractions unless they have a common denominator.

	1.	2.	3.	4.	5.	6.	7.	8.
(A)	$\frac{2}{3}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{2}{7}$	$\frac{1}{10}$	$\frac{2}{21}$
	$\frac{1}{21}$	$\frac{1}{8}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{2}{7}$	$\frac{7}{10}$	$\frac{1}{3}$
	$\frac{1}{21}$	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{1}{12}$	$\frac{1}{8}$	$\frac{1}{14}$	$\frac{1}{20}$	$\frac{1}{3}$
(B)	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{12}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{24}$	$\frac{1}{9}$
	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{10}$	$\frac{7}{24}$	$\frac{1}{9}$
	$\frac{3}{8}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{16}$	$\frac{5}{21}$	$\frac{2}{10}$	$\frac{1}{12}$	$\frac{7}{18}$

Problems

1. Ed and Jack raised a flock of turkeys. They sold $\frac{1}{3}$ of them at Thanksgiving, $\frac{1}{3}$ of them at Christmas, and $\frac{1}{6}$ of them at New Year's. What part of their flock did they sell?

2. Mary used $\frac{1}{4}$ of a yard of cloth for a doll dress and $\frac{1}{8}$ of a yard for ruffles to put on it. What part of a yard of cloth did Mary use all together?

Finding Common Denominators

You have learned how to find the common denominator of fractions when one of the denominators with which you are working is the common denominator. But suppose you want to add two fractions like $\frac{1}{2}$ and $\frac{1}{3}$. You cannot divide 2 by 3, and you cannot divide 3 by 2; so neither 3 nor 2 is the common denominator for $\frac{1}{2}$ and $\frac{1}{3}$. Remember, you cannot add fractions unless they have the same denominator. How can $\frac{1}{2}$ and $\frac{1}{3}$ be added? Can you think of a denominator to which both $\frac{1}{2}$ and $\frac{1}{3}$ can be changed? There are many such denominators. You can change both $\frac{1}{2}$ and $\frac{1}{3}$ to sixths (6ths), twelfths (12ths), or eighteenths

(18ths), or you can use still other denominators. Which denominator do you think would make the best common denominator for $\frac{1}{2}$ and $\frac{1}{3}$? The best one would be 6, because it is the smallest common denominator; and it is always best to work with as small numbers as you can. Can you make up a rule for finding a common denominator? See if you can.

Here is a rule for finding a common denominator. See if it is like the rule you made.

> To find a common denominator for some fractions, multiply the denominators of those fractions.

To find a common denominator for $\frac{1}{5}$ and $\frac{1}{6}$, multiply 5 and 6. The common denominator is 30.

Practice in Finding Common Denominators

Write the numbers 1 to 36 on a sheet of paper. Then, after the number of each example, write the common denominator that you would use if you were adding fractions with the denominators given here.

1. $\frac{1}{2}+\frac{1}{3}$
2. $\frac{1}{3}+\frac{1}{4}$
3. $\frac{1}{5}+\frac{1}{3}$
4. $\frac{1}{6}+\frac{1}{7}$
5. $\frac{1}{7}+\frac{1}{10}$
6. $\frac{1}{2}+\frac{1}{5}$
7. $\frac{1}{3}+\frac{1}{8}$
8. $\frac{1}{4}+\frac{1}{3}$
9. $\frac{1}{2}+\frac{1}{3}+\frac{1}{4}$
10. $\frac{1}{4}+\frac{1}{5}$
11. $\frac{1}{2}+\frac{1}{15}$
12. $\frac{1}{3}+\frac{1}{5}$
13. $\frac{1}{3}+\frac{1}{2}$
14. $\frac{1}{6}+\frac{1}{5}$
15. $\frac{1}{3}+\frac{1}{10}$
16. $\frac{1}{9}+\frac{1}{2}$
17. $\frac{1}{5}+\frac{1}{6}$
18. $\frac{1}{2}+\frac{1}{3}+\frac{1}{5}$
19. $\frac{1}{7}+\frac{1}{2}$
20. $\frac{1}{3}+\frac{1}{7}$
21. $\frac{1}{8}+\frac{1}{5}$
22. $\frac{1}{6}+\frac{1}{8}$
23. $\frac{1}{5}+\frac{1}{2}$
24. $\frac{1}{5}+\frac{1}{8}$
25. $\frac{1}{8}+\frac{1}{3}$
26. $\frac{1}{3}+\frac{1}{4}+\frac{1}{6}$
27. $\frac{1}{2}+\frac{1}{3}+\frac{1}{8}$
28. $\frac{1}{2}+\frac{1}{7}$
29. $\frac{1}{7}+\frac{1}{3}$
30. $\frac{1}{8}+\frac{1}{6}$
31. $\frac{1}{10}+\frac{1}{7}$
32. $\frac{1}{3}+\frac{1}{10}$
33. $\frac{1}{2}+\frac{1}{9}$
34. $\frac{1}{7}+\frac{1}{6}$
35. $\frac{1}{3}+\frac{1}{4}+\frac{1}{5}$
36. $\frac{1}{3}+\frac{1}{4}+\frac{1}{8}$

Practice in Adding Fractions

Add, and write the sums on a folded paper. Remember the rule for finding a common denominator when none of the denominators with which you are working is a common denominator.

	1.	2.	3.	4.	5.	6.	7.	8.
(A)	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{2}{5}$	$\frac{1}{7}$
	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{1}{7}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{1}{8}$
(B)	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{3}{5}$	$\frac{2}{3}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{1}{5}$	$\frac{1}{5}$
	$\frac{1}{9}$	$\frac{1}{7}$	$\frac{1}{6}$	$\frac{1}{10}$	$\frac{1}{7}$	$\frac{1}{4}$	$\frac{1}{7}$	$\frac{1}{8}$
(C)	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{3}{5}$	$\frac{5}{8}$
	$\frac{1}{15}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{3}{8}$	$\frac{2}{5}$	$\frac{2}{7}$	$\frac{1}{7}$	$\frac{1}{5}$
(D)	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{5}$	$\frac{1}{6}$
	$\frac{2}{7}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{10}$	$\frac{2}{9}$	$\frac{3}{8}$	$\frac{4}{7}$	$\frac{4}{7}$

Changing the Form of Fractions by Dividing

You have already learned that, by multiplying both terms of a fraction by the same number, you can change the form of the fraction without changing its value. But sometimes you need to change the form of a fraction in another way. If we add $\frac{1}{4}$ and $\frac{1}{4}$, the answer is $\frac{2}{4}$. But $\frac{2}{4} = \frac{1}{2}$. You have already learned that $\frac{2}{4} = \frac{1}{2}$; but if you had not known that $\frac{2}{4} = \frac{1}{2}$, you could have changed $\frac{2}{4}$ to $\frac{1}{2}$ by dividing both terms of $\frac{2}{4}$ by 2.

Multiply both terms of $\frac{1}{2}$ by 2. You should get $\frac{2}{4}$.

Now divide both terms of $\frac{2}{4}$ by 2. You should get $\frac{1}{2}$.

Divide both terms of the following fractions by 2, writing only your answers:

$$\frac{2}{4} \quad \frac{4}{6} \quad \frac{2}{8} \quad \frac{4}{10} \quad \frac{2}{6} \quad \frac{6}{8} \quad \frac{2}{10} \quad \frac{6}{16} \quad \frac{10}{12}$$

Divide both terms of the following fractions by 3, writing only your answers:

$$\frac{6}{9} \quad \frac{9}{15} \quad \frac{3}{12} \quad \frac{3}{9} \quad \frac{3}{6} \quad \frac{9}{12} \quad \frac{3}{24} \quad \frac{15}{18} \quad \frac{15}{24}$$

Here is a statement that will help you. Learn it.

> One way to change the form of a fraction without changing its value is to divide both terms of the fraction by the same number.
>
> $$\frac{2}{4} = \frac{2 \div 2}{4 \div 2} = \frac{1}{2}$$

Reducing Fractions to Lowest Terms

How can you change $\frac{6}{8}$ to a fraction having 4 as its denominator without changing the value of $\frac{6}{8}$? Can you change $\frac{6}{8}$ to a fraction having a number smaller than 4 as its denominator without changing the value of $\frac{6}{8}$?

How can you change $\frac{4}{6}$ to a fraction having 3 as its denominator without changing the value of $\frac{4}{6}$? Can you change $\frac{4}{6}$ to a fraction having a number smaller than 3 as its denominator without changing the value of $\frac{4}{6}$?

Dividing both terms of a fraction by the same number is called **reducing a fraction to lower terms.** $\frac{6 \div 2}{8 \div 2} = \frac{3}{4}$. You see, when you divide both terms of a fraction by the same number, you make the terms of the fraction smaller numbers.

You cannot divide evenly both terms of $\frac{2}{3}$ by any whole number except 1; so $\frac{4}{6}$ reduced to its lowest terms is $\frac{2}{3}$.

When both terms of a fraction cannot be divided evenly by any whole number except 1, the fraction is said to be in its lowest terms.

Reduce these fractions to their lowest terms:

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
(A)	$\frac{4}{6}$	$\frac{2}{4}$	$\frac{4}{10}$	$\frac{2}{8}$	$\frac{3}{12}$	$\frac{3}{6}$	$\frac{2}{16}$	$\frac{3}{9}$	$\frac{5}{15}$	$\frac{4}{12}$
(B)	$\frac{6}{9}$	$\frac{7}{14}$	$\frac{3}{18}$	$\frac{6}{21}$	$\frac{3}{21}$	$\frac{3}{24}$	$\frac{5}{10}$	$\frac{3}{15}$	$\frac{4}{20}$	$\frac{6}{8}$

Always reduce fractions to their lowest terms. After this, when fractions are not reduced to their lowest terms in the answers of problems, the answer will be counted wrong.

$$\frac{6}{12} = \frac{1}{2}$$

> To reduce a fraction to its lowest terms, divide the terms of the fraction by the largest number that will divide both of them without a remainder.

Sometimes it is necessary to divide large fractions two, three, or more times to reduce them to lowest terms. For example, reduce $\frac{24}{32}$ to its lowest terms.

$\frac{24}{32} = \frac{12}{16} = \frac{6}{8} = \frac{3}{4}$

First, if you divide both terms of $\frac{24}{32}$ by 2, you get $\frac{12}{16}$. But you can divide by 2 again. This gives $\frac{6}{8}$. Dividing both terms of $\frac{6}{8}$ by 2, you get $\frac{3}{4}$. Then, $\frac{24}{32} = \frac{3}{4}$. You could have reduced $\frac{24}{32}$ to $\frac{3}{4}$ at once by dividing by 8. It is better to divide by the larger number if you can. You may work such examples either way. The important thing is to keep on dividing until you cannot divide by anything else.

Practice in Finding Fractional Parts

In the exercises at the top of page 29, name one-half of each of the numbers in the first row; thus, "$\frac{1}{2}$ of 4 is 2;" "$\frac{1}{2}$ of 16 is 8;" "$\frac{1}{2}$ of 10 is 5;" etc.

Next name one-third of each of the numbers in the second row; thus, "$\frac{1}{3}$ of 6 is 2;" "$\frac{1}{3}$ of 15 is 5;" "$\frac{1}{3}$ of 9 is 3;" etc.

In the same way, name one-fourth of each number in the third row; one-fifth of each number in the fourth row; one-sixth of each number in the fifth row; one-seventh of each number in the sixth row; one-eighth of each number in the seventh row; and one-ninth of each number in the eighth row.

		1.	2.	3.	4.	5.	6.	7.	8.	9.
(A)	$\frac{1}{2}$	4	16	10	2	18	6	12	8	14
(B)	$\frac{1}{3}$	6	15	9	12	3	21	18	27	24
(C)	$\frac{1}{4}$	4	16	8	20	12	28	36	24	32
(D)	$\frac{1}{5}$	15	5	20	10	40	30	25	35	45
(E)	$\frac{1}{6}$	12	24	6	18	48	36	30	42	54
(F)	$\frac{1}{7}$	28	14	35	7	42	21	56	49	63
(G)	$\frac{1}{8}$	40	8	56	16	48	24	72	32	64
(H)	$\frac{1}{9}$	18	45	9	72	54	27	63	36	81

General Practice 1

Work these examples and problems. Time, 12 minutes.

1.	2.	3.	4.
Add: $\frac{4}{15}$ $\frac{7}{15}$ $\frac{2}{15}$	Reduce to lowest terms: $\frac{6}{21}$	$\frac{5}{8} = \frac{?}{24}$	Add: $\frac{1}{6}$ $\frac{4}{7}$

5.	6.	7.	8.
Add: $\frac{1}{2}$ $\frac{1}{15}$	Add: $\frac{5}{24}$ $\frac{3}{4}$	Find: $\frac{1}{9}$ of 63	Add: $\frac{1}{9}$ $\frac{7}{18}$ $\frac{1}{9}$

9. Eight inches is what part of a foot?
10. Nine inches is what part of a yard?
11. Twelve ounces is what part of a pound?
12. Twenty minutes is what part of an hour?

Solving Two-Step Problems

Problems in which you have only to add, or subtract, or multiply, or divide to get the answer are called one-step problems. Sometimes you have longer problems, in which you have to add and subtract, or add and multiply, or subtract and divide, and so on. Problems in which you have to do two things to find the answer are called two-step problems, you know. To work a two-step problem, all you have to do is to work the one-step problems that are in the two-step problem.

See if you can find the two one-step problems that are in the following problem.

Mary's father bought her a piano for $875. He paid $275 in cash and agreed to pay the balance at the rate of $25 a month. How long will it take to pay for the piano?

Suppose the above problem had been given as two one-step problems, thus:

Mary's father bought her a piano for $875. He paid $275 in cash. How much does he still owe?

Mary's father owes $600 on a piano. He pays $25 each month. How many months will it take to pay for the piano?

Think the answers where the question marks are.

Mary's father bought a piano for _____?_____.

He paid in cash _____?_____.

To find how much he still owes, I should ____?____.

The amount he still owes is about _____?_____.

The exact amount is _____?_____.

He paid _____?_____ a month.

To find how many months it will take, I should _____?_____ by _____?_____.

It will take about _____?_____ months.

The exact amount of time is _____?_____ months.

To prove, I can multiply _____?_____ by _____?_____ and add _____?_____.

My work _____?_____ (does or does not) prove.

Problems

1. Some boys in the neighborhood sold old papers and magazines and made $8.40. They bought a baseball for $1.30, a bat for 70¢, a catcher's glove for $3.75, and a first baseman's glove for $2.30. How much money did they have left?

2. Robert worked 2 hours on Monday, 3 hours on Tuesday, 1 hour on Wednesday, 4 hours on Thursday, 3 hours on Friday, and 8 hours on Saturday. Robert got 15¢ an hour. How much did he earn all together?

3. Mary bought an arithmetic for 92¢, a geography for $1.25, and a reader for 76¢. How much change should she have received from a $5 bill?

4. John wants a radio that will cost $78.50. He has $24.50 now. If John sells newspapers and saves $9 each month out of what he earns, in how many months will he have enough to buy the radio?

5. The seven linemen on the school football team weigh 142 lb., 157 lb., 143 lb., 165 lb., 144 lb., 153 lb., and 139 lb. What is the average weight of the seven men?

Practice in Adding Fractions

Add, and write the sums on a folded paper. Be sure to reduce them to lowest terms. Remember, you can divide both terms of a fraction by the same number without changing the value of the fraction.

	1.	2.	3.	4.	5.	6.	7.	8.
(A)	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{8}$	$\frac{1}{10}$	$\frac{3}{8}$	$\frac{1}{12}$
	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{5}{8}$	$\frac{3}{10}$	$\frac{3}{8}$	$\frac{5}{12}$
(B)	$\frac{1}{12}$	$\frac{3}{14}$	$\frac{5}{16}$	$\frac{2}{15}$	$\frac{1}{15}$	$\frac{5}{18}$	$\frac{4}{21}$	$\frac{1}{16}$
	$\frac{7}{12}$	$\frac{3}{14}$	$\frac{5}{16}$	$\frac{1}{15}$	$\frac{4}{15}$	$\frac{1}{18}$	$\frac{5}{21}$	$\frac{1}{16}$

Problems

1. George raised an acre of potatoes as a 4A club project. He sold $\frac{1}{4}$ of them to the grocer, $\frac{1}{3}$ of them to Mrs. Brown, who runs a boarding house, and $\frac{1}{12}$ of them to Mr. Jones for seed. The rest he kept. What part of his potatoes did he sell?

2. Henry jumped $\frac{1}{2}$ of a foot farther than the record in his school, and on the next attempt he jumped $\frac{1}{4}$ of a foot still farther. By what part of a foot did Henry beat the record the second time he jumped?

3. Louise and Dorothy went on a short hike. They walked $\frac{1}{4}$ of a mile down the concrete road and $\frac{1}{8}$ of a mile along a lane to the old mill pond. Then they walked home over the road they came. How far did they walk on the hike?

Practice in Adding Fractions

Add, and write the sums on a folded paper. Be sure to reduce them to lowest terms. Remember, you can divide both terms of a fraction by the same number without changing the value of the fraction.

	1.	2.	3.	4.	5.	6.	7.	8.
(A)		$\frac{1}{6}$	$\frac{1}{9}$	$\frac{1}{12}$				
	$\frac{1}{14}$	$\frac{1}{6}$	$\frac{1}{9}$	$\frac{1}{12}$	$\frac{1}{2}$	$\frac{1}{12}$	$\frac{1}{2}$	$\frac{1}{6}$
	$\frac{1}{14}$	$\frac{1}{6}$	$\frac{1}{9}$	$\frac{1}{12}$	$\frac{1}{6}$	$\frac{1}{4}$	$\frac{3}{10}$	$\frac{1}{3}$
(B)	$\frac{1}{3}$	$\frac{1}{5}$	$\frac{5}{14}$	$\frac{1}{6}$	$\frac{1}{4}$	$\frac{1}{7}$	$\frac{1}{6}$	$\frac{5}{6}$
	$\frac{1}{15}$	$\frac{3}{10}$	$\frac{1}{7}$	$\frac{1}{12}$	$\frac{1}{6}$	$\frac{1}{3}$	$\frac{1}{8}$	$\frac{1}{8}$

Problems

1. Mr. Smith owned $\frac{3}{8}$ of a store, Mr. Wilson owned $\frac{1}{4}$ of the store, and Mr. Thompson owned $\frac{3}{8}$ of the store. One day Mr. Wilson bought Mr. Smith's share of the store. What part of the store did Mr. Wilson then own?

2. One year $\frac{1}{4}$ of all the freight our railroads carried was manufactured goods and $\frac{1}{12}$ of the freight was products from our forests. What part of all our freight carried that year did these two kinds of freight represent?

3. Which is more, $\frac{1}{3}$ of my money or $\frac{1}{2}$ of my money?

4. A sheet of iron is $\frac{12}{32}$ of an inch thick. How many sixteenths of an inch thick is it? How many eighths of an inch thick is it?

Review of Mixed Numbers

You have learned about three kinds of numbers — whole numbers, fractions, and mixed numbers. You remember, of course, that a whole number means all of something, that a fraction is one or more of several equal parts of something, and that a mixed number is a whole number and a fraction.

Read these mixed numbers:

	1.	2.	3.	4.
(A)	$7\frac{1}{3}$	$1\frac{5}{12}$	$8\frac{3}{4}$	$16\frac{2}{3}$
(B)	$12\frac{3}{10}$	$36\frac{1}{6}$	$5\frac{7}{8}$	$2\frac{7}{10}$

Write in figures:

	1.	2.
(C)	Two and two-thirds	One and seven-eighths
(D)	Five and one-half	Seven and five-sixths
(E)	Six and three-fourths	Three and one-twelfth
(F)	Four and one-fourth	Eight and three-fifths

Write in words:

	1.	2.	3.	4.	5.
(G)	$7\frac{2}{3}$	$5\frac{3}{4}$	$6\frac{1}{8}$	$2\frac{1}{10}$	$27\frac{5}{6}$
(H)	$17\frac{1}{2}$	$6\frac{7}{8}$	$4\frac{11}{12}$	$1\frac{7}{8}$	$8\frac{5}{12}$

Different Kinds of Fractions

Read these fractions: $\frac{2}{3}$, $\frac{4}{5}$, $\frac{7}{8}$, $\frac{11}{15}$, $\frac{13}{16}$.

Did you notice that in each of these fractions the numerator is less than the denominator? These are proper fractions. Fractions in which the numerators are less than the denominators are called **proper fractions.** A proper fraction is always smaller than 1.

> A proper fraction is a fraction in which the numerator is less than the denominator.

Read these fractions: $\frac{3}{2}$, $\frac{15}{11}$, $\frac{4}{4}$, $\frac{8}{7}$, $\frac{9}{9}$.

Sometimes, you see, fractions have numerators that are equal to or greater than the denominators. They are improper fractions. Fractions in which the numerators are equal to or greater than the denominators are called **improper fractions.**

An improper fraction is a fraction in which the numerator is equal to or greater than the denominator.

1. Write ten proper fractions.
2. Write ten improper fractions.

Changing Improper Fractions to Whole or Mixed Numbers

Since improper fractions have numerators equal to or larger than the denominators, improper fractions are always equal to either a whole number or a mixed number. Therefore, since fractions should be in their simplest form, improper fractions should be changed to whole numbers or mixed numbers. To change $\frac{3}{3}$ to a whole number, divide the numerator by the denominator; that is, divide 3 by 3. You should get 1. To change $\frac{5}{3}$ to a mixed number, divide 5 by 3. You should get 1, with 2 over. Then, $\frac{5}{3} = 1\frac{2}{3}$. Sometimes, in working with improper fractions, you will have fractions like $\frac{8}{6}$. $\frac{8}{6} = 1\frac{2}{6}$. But you have just learned that fractions should be reduced to lowest terms; so $\frac{2}{6}$ must be reduced to $\frac{1}{3}$. Then, $1\frac{2}{6} = 1\frac{1}{3}$.

To change an improper fraction to a whole or mixed number, divide the numerator by the denominator and write the quotient as a whole or mixed number.

Practice in Changing Improper Fractions to Whole or Mixed Numbers

Change these improper fractions to whole or mixed numbers:

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
(A)	$\frac{2}{2}$	$\frac{11}{8}$	$\frac{29}{3}$	$\frac{13}{4}$	$\frac{10}{10}$	$\frac{45}{9}$	$\frac{15}{7}$	$\frac{9}{7}$	$\frac{7}{3}$	$\frac{8}{8}$
(B)	$\frac{11}{6}$	$\frac{1}{1}$		$\frac{13}{3}$	$\frac{50}{5}$	$\frac{8}{3}$	$\frac{25}{15}$	$\frac{6}{2}$	$\frac{21}{10}$	$\frac{3}{2}$
(C)	$\frac{5}{5}$	$\frac{9}{3}$	$\frac{3}{3}$	$\frac{110}{10}$	$\frac{39}{4}$	$\frac{14}{14}$	$\frac{24}{12}$	$\frac{25}{25}$	$\frac{18}{6}$	$\frac{7}{7}$
(D)	$\frac{23}{4}$	$\frac{11}{11}$	$\frac{5}{2}$	$\frac{13}{9}$	$\frac{4}{4}$	$\frac{20}{4}$	$\frac{17}{5}$	$\frac{12}{12}$	$\frac{5}{4}$	$\frac{9}{5}$
(E)	$\frac{15}{15}$	$\frac{7}{6}$	$\frac{19}{12}$	$\frac{11}{3}$	$\frac{6}{5}$	$\frac{15}{8}$	$\frac{5}{3}$	$\frac{17}{8}$	$\frac{38}{13}$	$\frac{7}{5}$
(F)	$\frac{21}{8}$	$\frac{23}{7}$	$\frac{7}{2}$	$\frac{25}{16}$	$\frac{31}{15}$	$\frac{47}{9}$	$\frac{33}{8}$	$\frac{4}{3}$	$\frac{23}{9}$	$\frac{19}{5}$

Practice in Adding Fractions

Add, and write the sums on a folded paper. Be sure to change improper fractions to whole or mixed numbers. Be sure to reduce fractions to lowest terms.

	1.	2.	3.	4.	5.	6.	7.	8.
(A)	$\frac{2}{3}$	$\frac{3}{5}$	$\frac{4}{7}$	$\frac{5}{9}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{5}{6}$	$\frac{7}{8}$
	$\frac{2}{3}$	$\frac{3}{5}$	$\frac{4}{7}$	$\frac{5}{9}$	$\frac{1}{2}$	$\frac{4}{3}$	$\frac{7}{6}$	$\frac{1}{8}$
(B)	$\frac{2}{5}$	$\frac{3}{4}$	$\frac{5}{6}$	$\frac{5}{8}$	$\frac{7}{16}$	$\frac{3}{8}$	$\frac{7}{10}$	$\frac{3}{15}$
	$\frac{2}{5}$	$\frac{3}{4}$	$\frac{5}{6}$	$\frac{3}{8}$	$\frac{9}{16}$	$\frac{3}{8}$	$\frac{7}{10}$	$\frac{8}{15}$
	$\frac{3}{5}$	$\frac{3}{4}$	$\frac{1}{6}$	$\frac{7}{8}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{10}$	$\frac{6}{15}$
(C)	$\frac{3}{4}$	$\frac{5}{6}$	$\frac{7}{8}$	$\frac{6}{10}$	$\frac{9}{16}$	$\frac{3}{8}$	$\frac{7}{12}$	$\frac{9}{15}$
	$\frac{3}{4}$	$\frac{5}{6}$	$\frac{7}{8}$	$\frac{6}{10}$	$\frac{9}{16}$	$\frac{7}{8}$	$\frac{7}{12}$	$\frac{9}{15}$

Changing Mixed Numbers to Improper Fractions

Not only do you sometimes need to change improper fractions to mixed numbers, but quite often it is necessary to change mixed numbers to improper fractions. Suppose you want to change $4\frac{2}{3}$ to an improper fraction with 3 as the denominator. You know that there are 3 thirds in 1; so there will be 4×3 thirds, or 12 thirds, in 4. But you had $4\frac{2}{3}$; so adding $\frac{12}{3}$ and $\frac{2}{3}$, you get $\frac{14}{3}$. In 1 there are $\frac{3}{3}$; therefore, in 4 there will be $4 \times \frac{3}{3}$, or $\frac{12}{3}$. Then, in $4\frac{2}{3}$ there will be $\frac{12}{3} + \frac{2}{3}$, or $\frac{14}{3}$.

$4\frac{2}{3} = \frac{14}{3}$

Therefore, $4\frac{2}{3} = \frac{14}{3}$.

> To change a mixed number to an improper fraction, multiply the whole number by the denominator of the fraction, add the numerator of the fraction to the product you have just obtained, and write the sum over the denominator.

Practice in Changing Mixed Numbers to Improper Fractions

Change the following mixed numbers to improper fractions:

	1.	2.	3.	4.	5.
(A)	$1\frac{1}{2}$	$2\frac{1}{3}$	$3\frac{1}{2}$	$5\frac{1}{6}$	$4\frac{3}{4}$
(B)	$7\frac{2}{3}$	$6\frac{3}{5}$	$1\frac{3}{4}$	$7\frac{1}{2}$	$5\frac{7}{8}$
(C)	$14\frac{3}{4}$	$4\frac{2}{3}$	$13\frac{1}{3}$	$2\frac{3}{8}$	$10\frac{1}{5}$
(D)	$9\frac{2}{5}$	$11\frac{5}{6}$	$8\frac{1}{8}$	$12\frac{4}{5}$	$3\frac{5}{8}$

Problems

1. How many whole dollars are there in 19 quarters? How many quarters are left over?

2. The butcher cut three half-pound slices of meat. How many pounds of meat did he cut?

3. John's mother bought three half pints of cream. How many pints of cream did she buy?

4. George helped a grocer measure some potatoes with a half-bushel measure. They measured $8\frac{1}{2}$ bushels. How many times did they have to fill the half-bushel measure to do this?

5. If George measured $3\frac{3}{4}$ bushels of apples with a peck measure, how many times did he fill the peck measure?

6. How many half-pound packages can be made from 1 pound of sugar? From 2 pounds? From $2\frac{1}{2}$ pounds? From 9 pounds? From $12\frac{1}{2}$ pounds?

Writing Remainders in Division as Fractions

$$\begin{array}{r} 37 \\ 16\overline{)597} \\ 48 \\ \hline 117 \\ 112 \\ \hline 5 \end{array}$$

or $16\overline{)597} = 37, \text{R. } 5$

or $16\overline{)597} = 37\frac{5}{16}$

You have learned that, when you divide one number by another, there is often a remainder. You have also learned that this remainder must be shown as a part of the quotient. Perhaps you have noticed that every time you change an improper fraction to a mixed number you solve an example in division. In changing $\frac{5}{3}$ to a mixed number, you divide 5 by 3 and get 1, with 2 over. But you have just learned that $\frac{5}{3}$ changed to a mixed number should be written $1\frac{2}{3}$. In the same way, you may think that every division problem you have had so far is a problem in changing an improper fraction to a mixed number. In dividing 597 by 16, you might do your work as it is done at the left.

$16\overline{)597} = \frac{597}{16} = 37\frac{5}{16}$

$$\begin{array}{r} 37\frac{5}{16} \\ 16\overline{)597} \\ 48 \\ \hline 117 \\ 112 \\ \hline 5 \end{array}$$

From now on you may think of all problems in division as problems in reducing improper fractions to whole or mixed numbers. Remember to write remainders in division problems as fractions just as the remainder 5 is written as $\frac{5}{16}$ in the example in this lesson.

Division Practice

Copy, and divide the following numbers. Be sure to write the remainders as fractions, and be sure that the fractions are in their lowest terms.

	1.	2.	3.	4.	5.
(A)	$8\overline{)78}$	$15\overline{)564}$	$51\overline{)412}$	$21\overline{)347}$	$81\overline{)585}$
(B)	$45\overline{)420}$	$13\overline{)83}$	$32\overline{)132}$	$65\overline{)330}$	$29\overline{)89}$
(C)	$37\overline{)396}$	$53\overline{)465}$	$17\overline{)291}$	$24\overline{)200}$	$72\overline{)600}$

Subtracting Fractions

In subtracting fractions, the denominators must be the same, just as in adding fractions. Also, in subtracting fractions, you subtract the numerators, but not the denominators, just as you added the numerators, but not the denominators, in adding fractions.

> In adding or subtracting fractions, you must see that they have a common denominator. The denominators must always be the same.

Practice in Subtracting Fractions

Subtract, and write the differences on a folded paper.

	1.	2.	3.	4.	5.	6.	7.	8.
(A)	$\frac{2}{3}$	$\frac{4}{5}$	$\frac{4}{5}$	$\frac{6}{7}$	$\frac{3}{4}$	$\frac{8}{9}$	$\frac{11}{15}$	$\frac{1}{2}$
	$\frac{1}{3}$	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{1}{7}$	$\frac{3}{4}$	$\frac{1}{9}$	$\frac{4}{15}$	$\frac{1}{2}$

	1.	2.	3.	4.	5.	6.	7.	8.
(B)	$\frac{7}{9}$	$\frac{6}{7}$	$\frac{5}{9}$	$\frac{4}{5}$	$\frac{3}{5}$	$\frac{5}{9}$	$\frac{4}{5}$	$\frac{3}{7}$
	$\frac{2}{9}$	$\frac{2}{7}$	$\frac{4}{9}$	$\frac{3}{5}$	$\frac{2}{5}$	$\frac{5}{9}$	$\frac{4}{5}$	$\frac{2}{7}$

Finding Missing Numerators

Think the right numerators for the following fractions:

	1.	2.	3.	4.
(A)	$1 = \frac{\quad}{2}$	$1 = \frac{\quad}{3}$	$1 = \frac{\quad}{4}$	$1 = \frac{\quad}{5}$
(B)	$1 = \frac{\quad}{6}$	$1 = \frac{\quad}{7}$	$1 = \frac{\quad}{8}$	$1 = \frac{\quad}{9}$
(C)	$1 = \frac{\quad}{10}$	$1 = \frac{\quad}{11}$	$1 = \frac{\quad}{12}$	$1 = \frac{\quad}{15}$
(D)	$1 = \frac{\quad}{16}$	$1 = \frac{\quad}{20}$	$1 = \frac{\quad}{32}$	$1 = \frac{\quad}{40}$

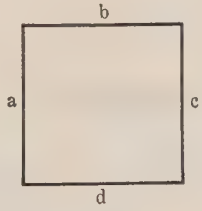
Subtracting Fractions from 1

Subtract. Do not write the differences. Just think them.

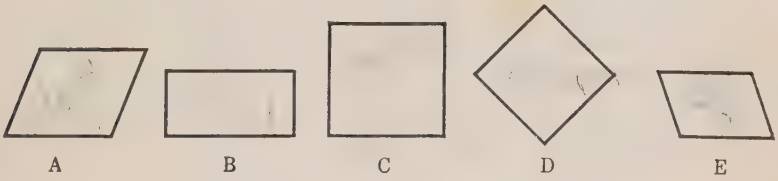
	1.	2.	3.	4.	5.	6.	7.	8.
(A)	1	1	1	1	1	1	1	1
	$\frac{1}{2}$	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{6}$	$\frac{1}{9}$	$\frac{1}{8}$	$\frac{1}{7}$
(B)	1	1	1	1	1	1	1	1
	$\frac{1}{10}$	$\frac{1}{12}$	$\frac{1}{15}$	$\frac{1}{16}$	$\frac{2}{3}$	$\frac{2}{5}$	$\frac{2}{7}$	$\frac{2}{9}$
(C)	1	1	1	1	1	1	1	1
	$\frac{2}{15}$	$\frac{3}{4}$	$\frac{3}{5}$	$\frac{3}{7}$	$\frac{3}{8}$	$\frac{3}{10}$	$\frac{3}{16}$	$\frac{4}{5}$
(D)	1	1	1	1	1	1	1	1
	$\frac{4}{7}$	$\frac{4}{9}$	$\frac{4}{15}$	$\frac{5}{6}$	$\frac{5}{7}$	$\frac{5}{8}$	$\frac{5}{9}$	$\frac{5}{12}$
(E)	1	1	1	1	1	1	1	1
	$\frac{5}{16}$	$\frac{6}{7}$	$\frac{7}{8}$	$\frac{7}{10}$	$\frac{7}{9}$	$\frac{7}{12}$	$\frac{7}{15}$	$\frac{11}{12}$

Squares

The figure below is a square. Any flat surface that has four equal sides and four right angles is called a square. The straight lines *a*, *b*, *c*, and *d* are the sides of the square.

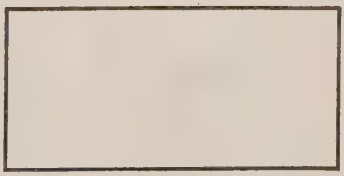


Name the squares below.



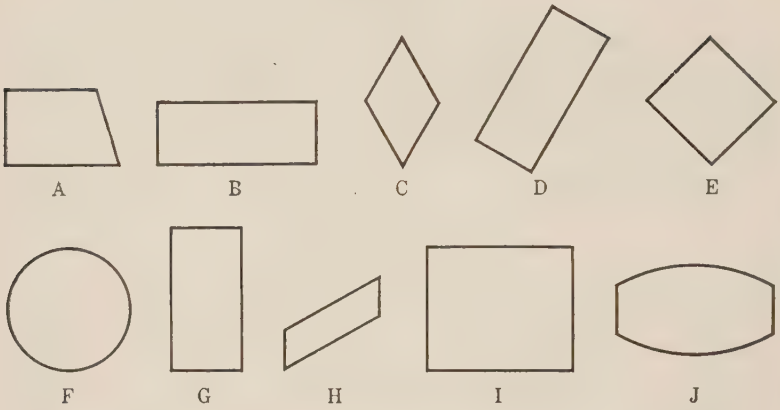
Rectangles

Here is a rectangle. Any flat surface that has four straight sides and four right angles is a rectangle.



A square is a rectangle, but a rectangle is not always a square. A rectangle is always longer than it is wide except in the case of a square.

1. Name the rectangles below.

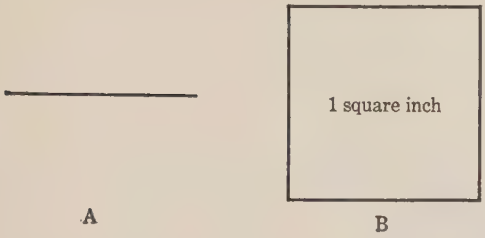


2. Find some rectangles in your schoolroom.
3. Find some rectangles on your playground.
4. Is your basket-ball court a rectangle?
5. Is your tennis court a rectangle?
6. What do we call the distance around a square or a rectangle or any other figure?

Problems

1. What is the perimeter of a square that is 1 inch on each side?
2. What is the perimeter of a square that is 3 inches on each side?
3. What is the perimeter of a rectangle that is 2 inches wide and 3 inches long?
4. A tennis court is 30 feet wide and 60 feet long. How far is it around a tennis court?
5. A baseball diamond is a square 90 feet long on each side. How many feet is it around a baseball diamond?

One Square Inch



1. Measure the length of line A with your ruler. How long is line A?

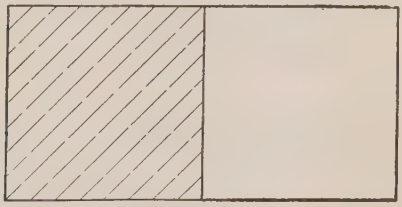
2. Measure the length of square B with your ruler. How long is square B?

3. Measure the width of square B with your ruler. How wide is square B?

When a square is 1 inch long and 1 inch wide, it has 1 square inch in it. A square inch is used in measuring the amount of surface in small squares and rectangles.

Finding the Area of Rectangles

How long is this figure?



How wide is it?

How many square inches are there in it?

2×1 square inch $= ?$

How long is this figure?

How wide is it?

How many square inches are there in it?

3 × 1 square inch = ?

In the following, think the right words where the question marks are.

The number of square inches in a rectangle:

1. 3 inches long and 1 inch wide = __?__ × 1 sq. in. = __?__
2. 8 inches long and 1 inch wide = __?__ × 1 sq. in. = __?__
3. 2 inches long and 1 inch wide = __?__ × 1 sq. in. = __?__
4. 6 inches long and 1 inch wide = __?__ × 1 sq. in. = __?__
5. 4 inches long and 1 inch wide = __?__ × 1 sq. in. = __?__
6. 7 inches long and 1 inch wide = __?__ × 1 sq. in. = __?__
7. 5 inches long and 1 inch wide = __?__ × 1 sq. in. = __?__
8. 9 inches long and 1 inch wide = __?__ × 1 sq. in. = __?__

Problems

1. A piece of paper is 1 inch wide and 5 inches long. How many square inches are there in it?

2. A paper that is 1 inch wide and 9 inches long can be cut into how many square inches?

3. If a piece of paper is 1 inch wide and 1 inch long, how many square inches are there in it?

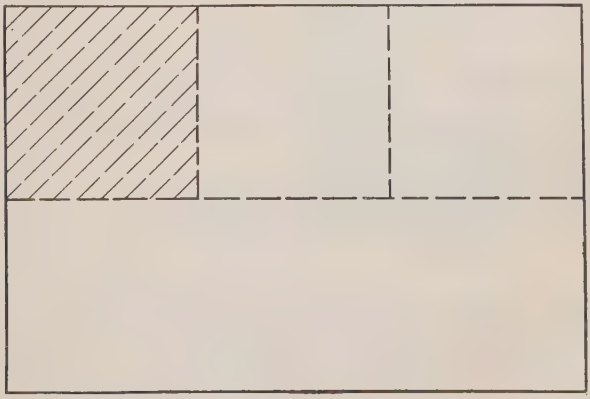
4. A piece of paper is 1 inch wide and 8 inches long. Into how many square inches can it be cut?

5. 7×1 sq. in. = ?
3×1 sq. in. = ?
6×1 sq. in. = ?

6. How can you find the number of square inches in any rectangle that is 1 inch wide?

Finding the Area of Wider Rectangles

How long is this figure?



How wide is it?

How many square inches are there in a strip 1 inch wide and 3 inches long?

If there are 3 square inches in a strip 1 inch wide and 3 inches long, how many square inches are there in 2 strips like that?

How many square inches are there in the figure?

$2 \times 3 \times 1$ square inch $= ?$

> Finding how many square inches, square feet, square yards, or other square units there are in anything is called finding the area of that thing.

What is the area of a rectangle 3 inches wide and 4 inches long?

One strip contains 3 square inches; 4 strips like that will contain 4×3 square inches, or 12 square inches. Then there are 12 square inches in a rectangle 3 inches wide and 4 inches long.

> To find the area of any rectangle, multiply the length by the width. The area is always in square units.

> The length and width of a rectangle are called the **dimensions** of the rectangle.

Now see if you can find the areas of some rectangles by yourself.

Find the area of each of the following rectangles, with the dimensions given:

1. A rectangle 1 inch wide and 4 inches long
2. A square 2 inches wide and 2 inches long
3. A rectangle 3 inches wide and 5 inches long
4. A rectangle 2 inches wide and 3 inches long
5. A square 3 inches wide and 3 inches long
6. A rectangle 3 inches wide and 4 inches long
7. A square 4 inches wide and 4 inches long
8. A rectangle 4 inches wide and 5 inches long
9. A rectangle 4 inches wide and 7 inches long
10. A rectangle 5 inches wide and 9 inches long

Writing Scales

Here is a drawing of a large picture. Measure this drawing with your ruler. How long is it? How wide is it? Do you think the real picture from which this drawing was made was only 2 inches long and $1\frac{1}{2}$ inches wide? No, it was 16 inches long and 12 inches wide, for $\frac{1}{8}$ of an inch in the drawing represents 1 inch in the real picture. In making pictures, maps, drawings, and house plans, short lines often represent long lines. When a line $\frac{1}{8}$ of an inch long is used to represent another line 1 inch long, the drawing is said to be made on a scale of $\frac{1}{8}$ in. = 1 in. If a line $\frac{1}{4}$ of an inch long represents a line 1 foot long, the scale is: $\frac{1}{4}$ in. = 1 ft.

Scale: $\frac{1}{8}$ in. = 1 in.

Write the scales for these:

1. If a line $\frac{1}{2}$ of an inch long represents a line 1 foot long.

2. If a line 1 inch long represents a line 1 foot long.

3. If a line $\frac{1}{4}$ of an inch long represents a line 1 inch long.

4. If a line $\frac{1}{2}$ of an inch long represents a line 6 inches long.

5. If a line $\frac{1}{8}$ of an inch long represents a line 1 foot long.

Practice with Scales

Think the right answers for these:

1. On a scale $\frac{1}{4}$ in. = 1 in., 1 in. = __?__ in.
2. On a scale $\frac{1}{2}$ in. = 1 ft., 1 in. = __?__ ft.
3. On a scale $\frac{1}{4}$ in. = 1 in., 2 in. = __?__ in.
4. On a scale $\frac{1}{2}$ in. = 1 ft., 2 in. = __?__ ft.
5. On a scale 1 in. = 1 ft., 5 in. = __?__ ft.
6. On a scale $\frac{1}{2}$ in. = 3 ft., 1 in. = __?__ ft.
7. On a scale $\frac{1}{4}$ in. = 1 ft., 3 in. = __?__ ft.
8. On a scale 1 in. = 2 ft., 7 in. = __?__ ft.
9. On a scale $\frac{1}{2}$ in. = 1 in., 3 in. = __?__ in.
10. On a scale 1 in. = 6 in., 5 in. = __?__ in.

Square Feet and Square Yards

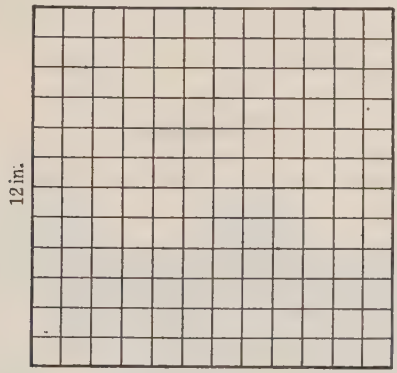
Scale: 1 in. = 1 ft.

If a square is 1 foot long and 1 foot wide, it has 1 square foot in it.

Name some things that could be measured in square feet.

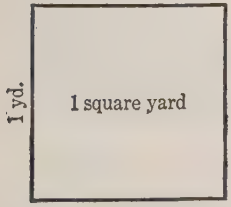
If a square is 12 inches long and 12 inches wide, it has 144 square inches in it; that is, 144 square inches make

1 square foot. You could find this number by counting all the small squares in the figure below; or you could work it out as an example as shown below the figure.



Scale: $1\frac{7}{8}$ in. = 1 ft.

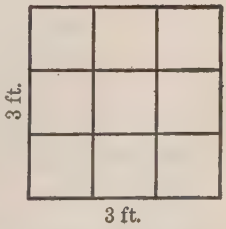
12 × 1 sq. in. = 12 sq. in. = the number of square inches in 1 strip. 12 × 12 sq. in. = 144 sq. in. = the number of square inches in 12 strips.



Scale: 1 in. = 1 yd.

If a square is 1 yard long and 1 yard wide, it contains 1 square yard. Is this what you would expect? Why?

Or if a square is 3 feet long and 3 feet wide, it contains 9 square feet.



Scale: 1 in. = 1 yd.

3 × 1 sq. ft. = 3 sq. ft. = the number of square feet in 1 strip. 3 × 3 sq. ft. = 9 sq. ft. = the number of square feet in 3 strips.

144 square inches (144 sq. in.) = 1 square foot (1 sq. ft.)
9 square feet (9 sq. ft.) = 1 square yard (1 sq. yd.)

Problems

1. How many square feet are there in 2 square yards?

2. How many square inches are there in 3 square feet?

3. How many square yards are there in 27 square feet?

4. How many square feet are there in 288 square inches?

5. A window pane is 18 inches wide and 24 inches long. How many square inches are there in it?

6. A schoolroom floor is 16 feet wide and 22 feet long. How many square feet are there in the floor?

7. A picture is 14 inches wide and 18 inches long. How many square inches are there in it?

8. A teacher's desk is 36 inches wide and 48 inches long. How many square inches are there in it?

9. A teacher's desk is 3 feet wide and 4 feet long. How many square feet are there in it?

10. If there are 1728 square inches in the top of the teacher's desk, how many square feet are there in the top of the desk?

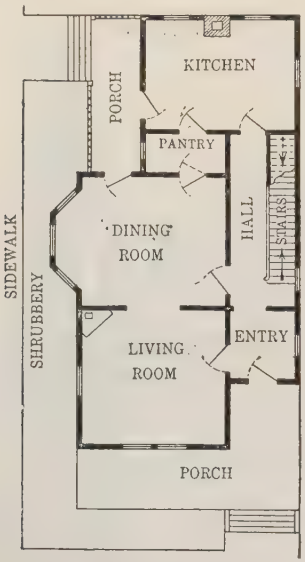
Planning for a New House

Mr. and Mrs. Young decided to build a new house. After looking at several plans, they thought they would like a house like this:

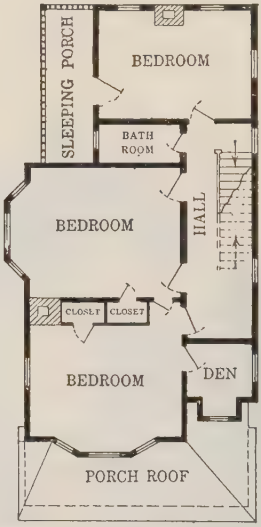
In the picture above, the house is drawn to a scale of $\frac{1}{16}$ in. = 1 ft.; that is, $\frac{1}{16}$ of an inch in the picture equals 1 foot in the real house.

1. Using your ruler to measure the picture, find out about how many feet high the real house will be.

2. The left-hand drawing is the plan of the first floor, drawn to a scale of $\frac{1}{16}$ in. = 1 ft. How many feet long is the kitchen? Measure from the inside of one line to the inside of the opposite line.



First-floor Plan



Second-floor Plan

3. How many feet wide is the kitchen?

4. What are the dimensions of the living room?

5. In the dining room, how many feet is it from the bay window to the opposite wall?

6. How wide is the dining room?

7. How long is the whole house from the front of the porch to the back of the kitchen?

8. How wide is the house at its widest point?

9. The right-hand drawing is the second-floor plan of the house that Mr. and Mrs. Young will build. It

also is drawn to a scale of $\frac{1}{16}$ in. = 1 ft. How many feet long is the sleeping porch?

10. How many feet wide is the sleeping porch?
11. What are the dimensions of the front bedroom?
12. What are the dimensions of the middle bedroom?
13. What are the dimensions of the back bedroom?

Buying a Lot

Mr. Young then looked for a vacant lot on which to build his new house. He preferred a corner lot in order to have more light and air. Some of the things he considered before buying the lot were these: Is the lot conveniently located to school and to car lines? Is it in a good residential district? Are the streets paved and the sidewalks around the lot completed? Is the sewer completed? Is it easy to get light and water?

1. Are there any other features which a good lot should possess? If so, what are they?
2. Find the prices of some vacant lots in the place where you live or in a near-by town.
3. Why are some lots much more expensive than others?
4. What are the advantages of the higher priced lots?
5. What are the dimensions of the lots you priced?

Drawing to Scale

Mr. Young bought a corner lot on Woodlawn Avenue, 75 feet wide and 150 feet deep, or long, on which to build his new home.

1. Draw a plan of the lot to a scale of $\frac{1}{16}$ in. = 1 ft.

2. Place the house on the drawing where you think it should be located. Be sure to draw the house to the same scale as the lot. You need not show the rooms in the house.

3. Draw to scale the sidewalks for the new house.

4. Draw a garage to scale, on the lot. The garage should be 12′ × 16′.

5. Is there room on the rear of the lot for a tennis court 30 feet wide and 60 feet long?

General Practice 3

Work these examples and problems. Time, 12 minutes.

1.	2.	3.	4.
Subtract:	Add:	Multiply:	Subtract:
$\frac{3}{8}$	571		201,003
$\frac{1}{4}$	62	7 × 1 sq. in.	14,976
	3		
	927		
	46		
	527		

5.	6.	7.	8.
	Add:	Divide:	Multiply:
	$\frac{5}{8}$		4175
	$\frac{3}{4}$	29)76,432	607

Scale: $\frac{1}{8}''$ = 1′

Measure the rectangle above and find the area that it represents.

9. Tom's father has a calf lot that is 90 feet wide and 110 feet long. How many feet of wire fencing will be needed for a new fence for the calf lot?

10. Our schoolroom is 24 feet wide and 32 feet long. How many square feet are there in the ceiling? How many feet of molding will be required to go around the ceiling?

11. On a scale of $\frac{1}{16}$ in. = 2 ft., how long should a line be made to represent 42 feet?

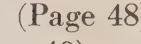
12. The capacity of a freight car is 57,120 pounds. How many bushels of corn, weighing 56 pounds each, can be put into the car?

Chapter Review

Here is a review of what you have studied in this chapter. Write the numbers 1 to 15 on a sheet of paper. After each number, write the answer to the question that has the same number.

At the end of each question you will see a page number. If you missed any part of the test, turn back to the page number given after that part of the test, where you will find how to answer what you missed. Study what you missed until you are sure you know what to do. Then go back to the review and again try the part you missed. Do this until you do not miss anything or until your teacher tells you to work on something else.

1. What kind of line is this: ———? (Page 48)

2. What kind of line is this:  ? (Page 48)

3. What is a right angle? (Page 48)

4. What is a square? (Page 49)

5. What is a rectangle? (Page 49)

6. What is a square inch? (Page 51)

7. How can you find the area of a rectangle that is 1 inch wide and 7 inches long? What is the area? (Page 51)

8. What is meant by the term "dimensions"? (Page 54)

9. What is meant by finding the area of anything? (Page 54)

10. What is meant by drawing to scale? (Page 55)

11. What is a square foot? (Page 57)

12. What is a square yard? (Page 57)

13. How many square inches are there in 1 square foot? (Page 57)

14. How many square feet are there in 1 square yard? (Page 57)

15. If $\frac{1}{16}$ of an inch in a picture of a house equals 1 foot in the real house, how high is the house if the picture of it is $2\frac{7}{16}$ inches high? (Page 59)

CHAPTER IV

Multiplying and Dividing Fractions and Whole Numbers

You have already learned that there are three kinds of numbers: whole numbers, like 2, 9, 17, 842, etc.; fractions, like $\frac{1}{2}$, $\frac{1}{3}$, $\frac{3}{4}$, $\frac{7}{8}$, $\frac{11}{12}$, etc.; and mixed numbers, like $2\frac{1}{2}$, $8\frac{1}{3}$, $18\frac{3}{4}$, etc. Also, you have already learned how to multiply whole numbers, like these:

9	24	347	2413
7	35	15	204
63	120	1735	9652
	72	347	48260
	840	5205	492,252

Did you ever wonder whether fractions could be multiplied or not? Did you ever think about how $\frac{2}{3}$ could be multiplied by $\frac{4}{5}$? Do you suppose that you ever have to multiply two mixed numbers? If a man knew that he burned $2\frac{1}{2}$ tons of coal a month last winter and that he ran the furnace $5\frac{1}{2}$ months, how could he tell how much coal he used? Would he need to know how to multiply mixed numbers?

In this chapter you will learn how to multiply fractions and whole numbers, and in a later chapter you will learn how to multiply mixed numbers.

Multiplying a Fraction by a Fraction

Mary: Grace, let's make some fudge. Here is a good recipe.

Grace: All right, that will be fun. What do we need?

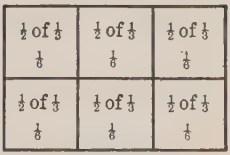
Mary: This recipe says to use 2 cups of sugar, $\frac{1}{2}$ cup of milk, 2 tablespoons of butter, $\frac{1}{2}$ teaspoon of vanilla, 3 teaspoons of cocoa, and $\frac{1}{2}$ cup of nut meats. That will make 16 pieces of fudge. Let's use just half as much of each and make only 8 pieces.

Grace: Yes, that will be enough. Then we shall need only 1 cup of sugar, $\frac{1}{4}$ cup of milk, 1 tablespoon of butter, $\frac{1}{4}$ teaspoon of vanilla, $1\frac{1}{2}$ teaspoons of cocoa, and $\frac{1}{4}$ cup of nut meats. Mary, did you know that $\frac{1}{2}$ of $\frac{1}{2}$ is $\frac{1}{4}$?

Mary: Yes, we learned that in school the other day. We learned that

$\frac{1}{2}$ of $\frac{1}{2}$ is $\frac{1}{4}$,
$\frac{1}{2}$ of $\frac{1}{4}$ is $\frac{1}{8}$,
$\frac{1}{2}$ of $\frac{1}{8}$ is $\frac{1}{16}$,

and many other useful facts. We can use facts like these in making one-half of a recipe or one-third of a recipe and in other ways.



In $\frac{1}{2}$ of $\frac{1}{2} = \frac{1}{4}$, do you see that, if you multiply one numerator by the other, you get the numerator of the answer, and if you multiply one denominator by the other, you get the denominator of the answer? That is, $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$.

In $\frac{1}{2}$ of $\frac{1}{3} = \frac{1}{6}$, if you multiply one numerator by the other numerator, you get the numerator of the answer; and if you multiply one denominator by the other denominator, you get the denominator of the answer. That is, $\frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$.

From this, you see that **"of"** means **"times"** or " $\times$ ". Whenever you see "of" between two fractions, remember that it means that you are to multiply.

"Of" means "times" or " $\times$ ".

To multiply fractions, multiply the numerators, then multiply the denominators, and write the product of the numerators over the product of the denominators. Reduce the answer to lowest terms.

Are these multiplied right?

$\frac{1}{2} \times \frac{3}{5} = \frac{3}{10}$ $\quad \frac{2}{3} \times \frac{4}{5} = \frac{8}{15}$ $\quad \frac{3}{4} \times \frac{1}{2} = \frac{3}{8}$

$\frac{2}{3} \times \frac{2}{3} = \frac{4}{9}$ $\quad \frac{1}{2} \times \frac{3}{7} = \frac{3}{14}$ $\quad \frac{2}{5} \times \frac{3}{5} = \frac{6}{25}$

Finding Parts of Fractions

Work these:

	1.	2.	3.	4.
(A)	$\frac{1}{2}$ of $\frac{1}{4}$	$\frac{2}{3}$ of $\frac{1}{3}$	$\frac{1}{2}$ of $\frac{1}{8}$	$\frac{3}{4}$ of $\frac{1}{4}$
(B)	$\frac{3}{4}$ of $\frac{3}{4}$	$\frac{1}{2}$ of $\frac{1}{5}$	$\frac{2}{3}$ of $\frac{2}{3}$	$\frac{1}{2}$ of $\frac{1}{9}$
(C)	$\frac{1}{3}$ of $\frac{1}{2}$	$\frac{3}{4}$ of $\frac{5}{7}$	$\frac{1}{2}$ of $\frac{1}{6}$	$\frac{2}{3}$ of $\frac{4}{5}$
(D)	$\frac{2}{3}$ of $\frac{1}{7}$	$\frac{1}{3}$ of $\frac{1}{3}$	$\frac{3}{4}$ of $\frac{5}{8}$	$\frac{1}{2}$ of $\frac{1}{7}$
(E)	$\frac{1}{3}$ of $\frac{1}{4}$	$\frac{1}{2}$ of $\frac{3}{4}$	$\frac{3}{5}$ of $\frac{1}{2}$	$\frac{1}{3}$ of $\frac{3}{4}$
(F)	$\frac{1}{2}$ of $\frac{5}{6}$	$\frac{3}{5}$ of $\frac{2}{3}$	$\frac{1}{3}$ of $\frac{2}{3}$	$\frac{1}{2}$ of $\frac{5}{7}$

Practice in Multiplying a Fraction by a Fraction

Multiply these. Think the products; do not write them.

	1.	2.	3.	4.
(A)	$\frac{1}{2} \times \frac{1}{2}$	$\frac{2}{3} \times \frac{4}{5}$	$\frac{1}{3} \times \frac{2}{3}$	$\frac{3}{4} \times \frac{3}{4}$
(B)	$\frac{3}{4} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{4}$	$\frac{2}{3} \times \frac{4}{7}$	$\frac{1}{3} \times \frac{2}{5}$
(C)	$\frac{1}{3} \times \frac{4}{5}$	$\frac{3}{4} \times \frac{3}{5}$	$\frac{1}{2} \times \frac{1}{3}$	$\frac{2}{3} \times \frac{5}{9}$
(D)	$\frac{3}{4} \times \frac{1}{5}$	$\frac{1}{3} \times \frac{4}{7}$	$\frac{3}{4} \times \frac{5}{7}$	$\frac{1}{2} \times \frac{1}{5}$

Problems

1. If a muffin recipe will make enough muffins for 18 people, what part of the recipe should be used to make muffins for 9 people?

2. If a recipe will make enough biscuits for 12 people, what part of the recipe should be used for 4 people?

3. If a recipe will make enough waffles for 16 people, how much should be used for 8 people?

4. A recipe for ice cream for 12 people calls for $\frac{3}{4}$ of a cup of sugar. How much sugar should be used if ice cream is made for 6 people?

5. In making 16 little cakes, $\frac{1}{2}$ of a cup of milk is used. How much milk should be used to make 8 little cakes?

6. To make fudge for 4 people, 1 cup of sugar, $\frac{1}{2}$ cup of milk, 1 tablespoon of butter, $\frac{1}{4}$ teaspoon of vanilla, 2 teaspoons of cocoa, and $\frac{1}{4}$ cup of nut meats are used. How much of each of these should be used to make fudge for 2 people?

Multiplying a Fraction by a Whole Number

What is $4 + 4 + 4$? What is 4×3?
What is $\frac{2}{7} + \frac{2}{7} + \frac{2}{7}$? What is $\frac{2}{7} \times 3$?
Do you see that $\frac{2}{7} + \frac{2}{7} + \frac{2}{7} = \frac{6}{7}$?
Also, do you see that $\frac{2}{7} \times 3 = \frac{6}{7}$?
That is, if you write 3 in the form of a fraction, like this: $\frac{3}{1}$, and multiply, you get

$$\frac{2}{7} \times \frac{3}{1} = \frac{6}{7}, \text{ the same as before.}$$

Any whole number may be written as a fraction by using 1 as a denominator; thus:

$$2 = \frac{2}{1} \qquad 5 = \frac{5}{1} \qquad 9 = \frac{9}{1} \qquad 12 = \frac{12}{1}$$

So, to multiply a fraction by a whole number, first write the whole number as a fraction by using 1 as a denominator and then write the product of the numerators over the product of the denominators.

> To multiply a fraction by a whole number, write the whole number as a fraction, multiply the numerators, multiply the denominators, and write the product of the numerators over the product of the denominators.

Are these multiplied right?

$$\frac{2}{3} \times 4 = \frac{2}{3} \times \frac{4}{1} = \frac{8}{3} = 2\frac{2}{3}$$

$$\frac{2}{5} \times 3 = \frac{2}{5} \times \frac{3}{1} = \frac{6}{5} = 1\frac{1}{5}$$

$$\frac{3}{4} \times 5 = \frac{3}{4} \times \frac{5}{1} = \frac{15}{4} = 3\frac{3}{4}$$

$$\frac{3}{5} \times 2 = \frac{3}{5} \times \frac{2}{1} = \frac{6}{5} = 1\frac{1}{5}$$

Problems

1. Sarah bought 5 yards of ribbon and used $\frac{1}{3}$ of it for a doll's dress. How many yards did Sarah use for the doll's dress?

2. George decided to save $\frac{1}{2}$ of all the money he earned. One week he earned 78 cents and put half of it into his savings bank. How much did he put into the bank?

3. Tom worked 16 examples in a test and had $\frac{7}{8}$ of them right. How many were right?

4. Mary used 2 yards of lace in making a dress, and Jane used $\frac{2}{3}$ as many yards as Mary. How many yards did Jane use?

5. Charles can run $\frac{9}{10}$ as far as Henry in the same time. While Henry runs 100 yards, how far will Charles run?

Practice in Multiplying a Fraction by a Whole Number

Multiply these fractions and whole numbers. Change improper fractions in the products to mixed numbers.

	1.	2.	3.	4.
(A)	$\frac{2}{3} \times 5$	$\frac{2}{9} \times 4$	$\frac{1}{3} \times 4$	$\frac{7}{8} \times 1$
(B)	$\frac{1}{7} \times 3$	$\frac{2}{3} \times 7$	$\frac{1}{9} \times 5$	$\frac{1}{3} \times 2$
(C)	$\frac{1}{3} \times 8$	$\frac{2}{9} \times 2$	$\frac{3}{4} \times 3$	$\frac{1}{9} \times 7$
(D)	$\frac{2}{7} \times 3$	$\frac{1}{2} \times 3$	$\frac{4}{5} \times 1$	$\frac{3}{4} \times 5$

Multiplication Practice

Multiply, and write the products on a folded paper.

	1.	2.	3.	4.	5.	6.
(A)	43	37	312	318	128	489
	2	5	4	5	7	9
(B)	82	22	57	72	79	406
	12	34	30	67	58	18
(C)	537	212	586	429	463	2174
	28	143	327	508	700	38

Multiplying a Whole Number by a Fraction

What is 4×3? What is 3×4?
What is 2×5? What is 5×2?
What is $\frac{2}{7} \times 3$? What is $3 \times \frac{2}{7}$?

Do you see that $3 \times \frac{2}{7}$ gives the same product that $\frac{2}{7} \times 3$ does? $\frac{2}{7} \times 3 = \frac{2}{7} \times \frac{3}{1} = \frac{6}{7}$. Then, $3 \times \frac{2}{7} = \frac{3}{1} \times \frac{2}{7} = \frac{6}{7}$.

What is $\frac{1}{3} \times 2$? What is $2 \times \frac{1}{3}$?
What is $\frac{2}{9} \times 4$? What is $4 \times \frac{2}{9}$?
What is $\frac{2}{7} \times 2$? What is $2 \times \frac{2}{7}$?

Are these multiplied right?

$3 \times \frac{1}{7} = \frac{3}{1} \times \frac{1}{7} = \frac{3}{7}$ $\quad$ $4 \times \frac{2}{5} = \frac{4}{1} \times \frac{2}{5} = \frac{8}{5} = 1\frac{3}{5}$

$3 \times \frac{2}{5} = \frac{3}{1} \times \frac{2}{5} = \frac{6}{5} = 1\frac{1}{5}$ $\quad$ $5 \times \frac{2}{7} = \frac{5}{1} \times \frac{2}{7} = \frac{10}{7} = 1\frac{3}{7}$

Practice in Multiplying a Whole Number by a Fraction

Multiply these. Change improper fractions to mixed numbers.

	1.	2.	3.	4.
(A)	$4 \times \frac{2}{3}$	$5 \times \frac{1}{2}$	$5 \times \frac{1}{3}$	$9 \times \frac{1}{2}$
(B)	$5 \times \frac{3}{4}$	$5 \times \frac{2}{3}$	$3 \times \frac{1}{8}$	$7 \times \frac{1}{3}$
(C)	$7 \times \frac{3}{4}$	$4 \times \frac{2}{9}$	$7 \times \frac{2}{3}$	$3 \times \frac{3}{4}$
(D)	$8 \times \frac{1}{3}$	$7 \times \frac{1}{8}$	$9 \times \frac{3}{4}$	$8 \times \frac{2}{3}$

Problems

1. Is there any difference between the answers to $\frac{2}{3}$ of 18, $\frac{2}{3} \times 18$, and $18 \times \frac{2}{3}$?

2. Mary has $\frac{3}{4}$ of a yard of ribbon. She wants to put half of it on a doll's dress. What part of a yard of ribbon does Mary want to put on the doll's dress?

3. Which of these two examples gives the larger product, $8 \times \frac{1}{2}$ or $8 \times \frac{1}{4}$?

4. Mr. Work and his two boys are growing tomatoes for the cannery. Mr. Work planted $\frac{3}{5}$ of an acre of tomatoes; Robert, age 14, planted $\frac{1}{5}$ of an acre; and Dan, age 10, planted $\frac{1}{10}$ of an acre. What fraction of an acre was planted by the three together?

5. George has $12 in his savings bank. He earned $\frac{3}{4}$ of this money by selling papers and running errands,

and his father gave him $\frac{1}{4}$ of the money. How much money did George earn? How much money did his father give him?

6. Frank serves as janitor to help earn his way through high school. He spends $\frac{1}{6}$ of what he earns for clothes, $\frac{1}{12}$ for books and supplies, and $\frac{1}{16}$ for laundry. What part of the money he earns does he spend for these three items?

Changing Recipes

Following are some cooking recipes. Each recipe tells for how many people it is made. For each recipe you may find out how much of each article should be used to change the recipe for the number of people named.

FUDGE (8 people)

2 cups of sugar
1 cup of milk
2 tablespoons of butter
$\frac{1}{2}$ teaspoon of vanilla
3 teaspoons of cocoa
$\frac{1}{2}$ cup of nuts

1. Change this recipe so that it will serve 24 people.

WAFFLES (4 people)

2 cups of flour
2 teaspoons of baking powder
$\frac{1}{4}$ teaspoon of salt
Yolks of 2 eggs
1 cup of thin cream
4 tablespoons of melted butter
Whites of 2 eggs, beaten dry

2. Change this recipe to suit 2 people.

ICE CREAM (18 people)

1 quart of milk
1 cup of sugar
1 tablespoon of cornstarch
3 eggs
4 cups of thin cream
1 tablespoon of vanilla

3. Change this recipe so that it will serve 6 people.

Fruit Cake

4 cups of flour
$\frac{1}{2}$ teaspoon of salt
1 teaspoon of baking powder
2 teaspoons of cinnamon
$\frac{3}{4}$ teaspoon of allspice and nutmeg
$\frac{1}{2}$ teaspoon of cloves
$\frac{1}{2}$ teaspoon of mace
3 pounds of seeded raisins
1 pound of currants
1 pound of chopped figs
1 pound of sliced citron
Grated rind of 1 lemon
2 cups of butter
2 cups of sugar
12 eggs
$\frac{1}{2}$ cup of coffee

4. Cut this recipe down to one-half.

Problems

1. Sarah is to make some badges for her club. If each badge takes $\frac{1}{8}$ of a yard of ribbon, how many yards of ribbon will be needed for 15 badges?

2. Henry exchanged 3 dozen eggs at 40¢ a dozen for sugar at 5¢ a pound. How many pounds of sugar did he get?

3. How many dozen eggs at 25¢ a dozen must I give in exchange for 50 pounds of sugar at 6¢ a pound?

4. George's mother wishes to make some towels $\frac{3}{4}$ of a yard long. How many yards of toweling must she buy for 12 towels?

5. If a pound of boiled ham costs $.72, what will $\frac{3}{4}$ of a pound cost? What will 4 ounces cost? What will 8 ounces cost?

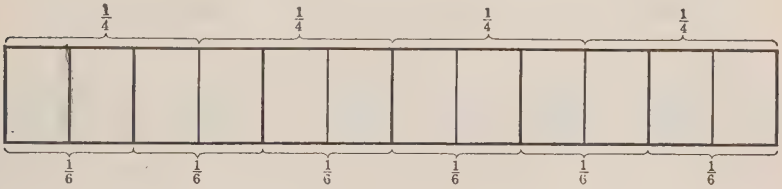
6. Henry's mother exchanged 10 pounds of butter at 42¢ a pound for sugar at 6¢ a pound. How many pounds of sugar did Henry's mother get?

7. Grace bought $\frac{2}{3}$ of a yard of gingham and used $\frac{3}{4}$ of it for a doll's dress. How much gingham was used for the dress?

8. If lemons cost \$.48 a dozen, what will $\frac{1}{2}$ dozen cost? What will 7 lemons cost? What will 10 lemons cost?

Cancellation

What is $\frac{2}{3}$ of $\frac{1}{4}$?



You know how to find $\frac{2}{3}$ of $\frac{1}{4}$ this way: $\frac{2}{3}$ of $\frac{1}{4} = \frac{2}{3} \times \frac{1}{4} = \frac{2}{12} = \frac{1}{6}$. There is a short way of finding $\frac{2}{3}$ of $\frac{1}{4}$. It is like this:

$$\frac{\cancel{2}}{3} \text{ of } \frac{1}{\cancel{4}_{2}} = \frac{1}{6}$$

This is called **cancellation.** You cancel when you reduce fractions to lower terms. For instance, when you change $\frac{6}{8}$ to $\frac{3}{4}$, you divide both the 6 and the 8 by 2; that is, you cancel 2 out of the numerator and the denominator of $\frac{6}{8}$. In the same way, you may often cancel when you are multiplying fractions. If you were to put down all the work for the example at the beginning of this lesson, it would look like this:

$$\frac{\cancel{2}^{1}}{3} \text{ of } \frac{1}{\cancel{4}_{2}} = \frac{1}{6}$$

Dividing the numerator 2 by 2 gives 1; and dividing the denominator 4 by 2 gives 2. Then, multiplying 1 by 1 gives 1 as the numerator of the product, and multiplying 3 by 2 gives 6 as the denominator of the product. It is shorter, however, to leave out all the 1's, in canceling. Do not write them at all, but write all the other numbers. Study these examples that are worked out for you so that you can cancel wherever possible.

$\frac{\cancel{2}}{3} \times \frac{5}{\cancel{4}_{2}} = \frac{5}{6}$ $\qquad$ $\frac{\cancel{6}}{4} \times \frac{5}{\cancel{6}_{2}} = \frac{5}{8}$ $\qquad$ $\frac{\cancel{2}}{3} \times \frac{5}{\cancel{8}_{4}} = \frac{5}{12}$

Sometimes you can cancel in another direction. Thus, in $\frac{1}{4}$ of $\frac{2}{3}$, you can cancel the 2 into the 4, like this:

$$\frac{1}{\cancel{4}_{2}} \text{ of } \frac{\cancel{2}}{3} = \frac{1}{6}$$

In $\frac{2}{3}$ of $\frac{6}{7}$, you can cancel the 3 into the 6, like this:

$$\frac{2}{\cancel{3}} \text{ of } \frac{\overset{2}{\cancel{6}}}{7} = \frac{4}{7}$$

In $\frac{4}{5}$ of $\frac{1}{2}$, you can cancel the 2 into the 4, like this:

$$\frac{\overset{2}{\cancel{4}}}{5} \text{ of } \frac{1}{\cancel{2}} = \frac{2}{5}$$

And, in some examples, you can cancel in two directions. Study these:

$\frac{\cancel{2}}{\cancel{3}} \times \frac{\overset{3}{\cancel{6}}}{\cancel{4}_{2}} = \frac{3}{2} = 1\frac{1}{2}$ $\qquad$ $\frac{\cancel{6}}{\cancel{4}_{2}} \times \frac{\cancel{2}}{\cancel{9}_{3}} = \frac{1}{6}$

$\frac{\overset{2}{\cancel{4}}}{\cancel{5}} \times \frac{\overset{3}{\cancel{15}}}{\cancel{2}} = 6$ $\qquad$ $\frac{\overset{3}{\cancel{15}}}{\cancel{8}_{4}} \times \frac{\cancel{2}}{\cancel{5}} = \frac{3}{4}$

Numbers That Can Be Divided by 2 Exactly

The number 2 will divide exactly 2, 4, 6, 8, 10, 12, 14, 16, 18, or any other number that ends in 0, 2, 4, 6, or 8. Numbers that contain 2 exactly are called **even numbers.** All other numbers are called **odd numbers.** Since 2 divides any even number exactly, 2 can be canceled into every even number.

> The number 2 exactly divides every even number.

Using cancellation, multiply the following fractions. Think the answers; do not write them.

	1.	2.	3.	4.
(A)	$\frac{2}{1} \times \frac{1}{4}$	$\frac{2}{1} \times \frac{1}{12}$	$\frac{2}{1} \times \frac{1}{18}$	$\frac{2}{1} \times \frac{1}{10}$
(B)	$\frac{1}{6} \times \frac{2}{1}$	$\frac{1}{14} \times \frac{2}{1}$	$\frac{1}{2} \times \frac{2}{1}$	$\frac{1}{8} \times \frac{2}{1}$
(C)	$\frac{1}{2} \times \frac{16}{1}$	$\frac{1}{2} \times \frac{18}{1}$	$\frac{1}{2} \times \frac{12}{1}$	$\frac{1}{2} \times \frac{8}{1}$
(D)	$\frac{10}{1} \times \frac{1}{2}$	$\frac{18}{1} \times \frac{1}{2}$	$\frac{12}{1} \times \frac{1}{2}$	$\frac{6}{1} \times \frac{1}{2}$

Numbers That Can Be Divided by 3 Exactly

> Figures are sometimes called **digits.** The ten digits are: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

The number 3 will divide exactly any number if the sum of the digits of the number can be divided by 3 with no remainder. Thus, in the number 84, the

digits are 8 and 4. The sum of 8 and 4 is 12, and 12 can be divided exactly by 3. Then, 84 can be divided exactly by 3. You can use this way to find whether any number can be divided by 3. Study these:

216 $2 + 1 + 6 = 9$ 9 can be divided by 3. 216 can be divided by 3.

57 $5 + 7 = 12$ 12 can be divided by 3. 57 can be divided by 3.

49 $4 + 9 = 13$ 13 cannot be divided by 3. 49 cannot be divided by 3.

37 $3 + 7 = 10$ 10 cannot be divided by 3. 37 cannot be divided by 3.

Choose the numbers below that can be divided by 3.

15	28	3	49	30	48
58	18	31	6	52	33
36	64	21	45	9	55
51	39	67	24	34	12
73	61	42	70	27	46

Using cancellation, multiply the following fractions. Think the answers; do not write them.

	1.	2.	3.	4.
(A)	$\frac{1}{3} \times \frac{36}{1}$	$\frac{3}{1} \times \frac{1}{18}$	$\frac{1}{6} \times \frac{3}{1}$	$\frac{3}{1} \times \frac{1}{3}$
(B)	$\frac{9}{1} \times \frac{1}{3}$	$\frac{1}{12} \times \frac{3}{1}$	$\frac{1}{3} \times \frac{21}{1}$	$\frac{3}{1} \times \frac{1}{24}$
(C)	$\frac{33}{1} \times \frac{1}{3}$	$\frac{1}{27} \times \frac{3}{1}$	$\frac{1}{3} \times \frac{15}{1}$	$\frac{3}{1} \times \frac{1}{30}$

Numbers That Can Be Divided by 5 Exactly

The number 5 will divide exactly 5, 10, 15, 20, 25, 30, 35, 40, 45, or any other number that ends in 0 or 5. Thus, 5 will divide exactly 75, 430, 95, 80, etc. Name some other numbers that 5 will divide exactly.

Choose the numbers below that 5 will divide exactly.

56	5	60	69
95	73	10	200
40	130	54	15
32	45	29	58
83	71	50	552
30	82	501	20
140	35	47	46

Using cancellation, multiply the following fractions. Think the answers; do not write them.

	1.	2.	3.	4.
(A)	$\frac{5}{1} \times \frac{1}{60}$	$\frac{1}{25} \times \frac{5}{1}$	$\frac{1}{5} \times \frac{5}{1}$	$\frac{40}{1} \times \frac{1}{5}$
(B)	$\frac{1}{45} \times \frac{5}{1}$	$\frac{5}{1} \times \frac{1}{65}$	$\frac{1}{5} \times \frac{30}{1}$	$\frac{10}{1} \times \frac{1}{5}$
(C)	$\frac{1}{15} \times \frac{5}{1}$	$\frac{50}{1} \times \frac{1}{5}$	$\frac{1}{5} \times \frac{70}{1}$	$\frac{5}{1} \times \frac{1}{35}$
(D)	$\frac{5}{1} \times \frac{1}{80}$	$\frac{1}{5} \times \frac{20}{1}$	$\frac{55}{1} \times \frac{1}{5}$	$\frac{1}{75} \times \frac{5}{1}$

Cancellation Practice

Multiply, using cancellation:

	1.	2.	3.	4.
(A)	$\frac{1}{4} \times \frac{4}{9}$	$\frac{1}{6}$ of $\frac{6}{7}$	$\frac{3}{8} \times \frac{4}{5}$	$\frac{3}{2} \times \frac{2}{3}$
(B)	$\frac{1}{3} \times \frac{3}{10}$	$\frac{8}{9} \times \frac{3}{4}$	$\frac{5}{12}$ of $\frac{4}{5}$	$\frac{7}{16} \times \frac{8}{9}$
(C)	$\frac{7}{8} \times \frac{2}{3}$	$\frac{1}{3}$ of $\frac{9}{16}$	$\frac{7}{6} \times \frac{6}{7}$	$\frac{5}{8} \times \frac{16}{25}$
(D)	$\frac{1}{6} \times \frac{14}{15}$	$\frac{7}{8} \times \frac{8}{7}$	$\frac{9}{10} \times \frac{2}{3}$	$\frac{14}{15} \times \frac{6}{7}$

General Practice 4

Work these examples and problems. Time, 12 minutes.

1.	2.	3.	4.
Multiply:	Add:	Multiply:	Divide:
$\frac{3}{4} \times 5$	$\frac{5}{8}$ $\frac{7}{12}$	$\frac{2}{3} \times \frac{4}{5}$	$38\overline{)57{,}493}$

5.	6.	7.	8.
Multiply:	Find:	Subtract:	Multiply:
647 908	$\frac{3}{7}$ of $\frac{1}{2}$	$\frac{11}{12}$ $\frac{2}{3}$	$5 \times \frac{2}{7}$

9. If a certain recipe will make enougn gingerbread for 18 people, what part of each article should be used to make a recipe for 3 people?

10. The salary of the President of the United States is $75,000 a year. How much is this per month? Using 365 as the number of days in a year, how much is it per day?

11. Kentucky Queen, a White Leghorn hen at the University of Kentucky Experiment Station, laid 300 eggs in one year. What was the average number of eggs she laid each month?

12. The average yield of corn in Kentucky is 27 bushels to the acre. The average yield under good farm practice is 50 bushels to the acre. If corn is worth $1.10 a bushel, what would be the difference in the value of the two yields on 10 acres of land?

Dividing Whole Numbers by Fractions and Fractions by Whole Numbers

Henry's father runs a woodworker's shop. One day Henry asked his father how many strips of wood $\frac{1}{2}$ of an inch wide could be cut from a board 16 inches wide. Henry's father said, "Don't you know that?" "No, I don't," said Henry. "Well," said Henry's father, "I'll try to show you. First, do you know what you would do if the strips were 8 inches wide, instead of $\frac{1}{2}$ of an inch wide?" "Yes," replied Henry, "I would divide 16 inches by 8 inches. There would be 2 strips." "That is right," said Henry's father. "Now suppose that the strips were only 4 inches wide. How many would there be?" "16 inches divided by 4

inches = 4; so there would be 4 strips," said Henry. "Yes," said Henry's father. "And suppose the strips were only 2 inches wide. How many would there be?" "16 inches divided by 2 inches = 8. There would be 8 strips," said Henry. "If the strips were only one inch wide, how many would there be?" asked Henry's father. "16 inches divided by 1 inch = 16. There would be 16 strips," said Henry. "Yes. Now can you tell me how many strips there would be if they were only $\frac{1}{2}$ an inch wide?" "No, that is the part I don't understand," said Henry. "Make a list of the examples you have just worked," said Henry's father, "and I believe you will see what the answer to my question should be."

So Henry made a list of his work like this:

$$16 \div 8 = 2$$
$$16 \div 4 = 4$$
$$16 \div 2 = 8$$
$$16 \div 1 = 16$$
$$16 \div \tfrac{1}{2} = ?$$

"I believe I see how many there would be," said Henry. "Wouldn't there be 32?" "Yes, $16 \div \frac{1}{2} = 32$, Henry; I can saw 32 strips $\frac{1}{2}$ of an inch wide from a board that is 16 inches wide, not allowing for waste in sawing. There are 2 half inches in 1 inch, and in 16 inches there would be 16×2 half inches, or 32 half inches." "I understand now, Father. Thank you."

Did you know the answer to Henry's question? Perhaps you could have answered it if you had known the rest of this lesson.

How many halves are there in 1?

How many halves are there in 2?

$\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 2$ Four $\frac{1}{2}$'s $= 2$ $2 \div \frac{1}{2} = 4$

Does $2 \div \frac{1}{2} = \frac{2}{1} \times \frac{2}{1}$?
Does $3 \div \frac{1}{2} = \frac{3}{1} \times \frac{2}{1}$?
Does $2 \div \frac{1}{3} = \frac{2}{1} \times \frac{3}{1}$?
Does $3 \div \frac{1}{3} = \frac{3}{1} \times \frac{3}{1}$?

Do you see an easy way of changing $\frac{1}{2}$ to $\frac{2}{1}$?
Do you see an easy way of changing $\frac{1}{3}$ to $\frac{3}{1}$?

When you change $\frac{1}{2}$ to $\frac{2}{1}$, you **invert** $\frac{1}{2}$; that is, you turn it upside down.

When you change $\frac{1}{3}$ to $\frac{3}{1}$, you invert $\frac{1}{3}$.

In dividing by a fraction, if you invert the divisor and then multiply, do you get the right answer? Try another example.

How many fourths are there in 1? $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = 1$. Then, $1 \div \frac{1}{4} = 4$. But $1 \times \frac{4}{1} = 4$. Then, $1 \div \frac{1}{4} = 1 \times \frac{4}{1} = 4$. Notice that you invert the divisor and multiply.

To divide a whole number by a fraction, change the whole number to a fraction with 1 as the denominator, invert the divisor, and then multiply as in multiplying fractions.

To divide a fraction by a whole number, write the whole number as a fraction with 1 as the denominator, invert this fraction, and multiply.

Practice in Inverting Fractions

Invert the following fractions. Think your answers; do not write them.

$\frac{2}{3}$ inverted = $\frac{3}{4}$ inverted =
$\frac{1}{4}$ inverted = $\frac{5}{6}$ inverted =
$\frac{3}{1}$ inverted = $\frac{1}{2}$ inverted =
$\frac{4}{7}$ inverted = $\frac{4}{5}$ inverted =

Problems

1. Henry has $\frac{3}{5}$ of a dollar which he wishes to divide equally among his 3 cousins. How much can he give to each?

2. Mary has a piece of ribbon that is $\frac{3}{4}$ of a yard long. She is going to cut the ribbon into 4 badges of equal length. How long will each badge be?

3. If you cut a piece of cloth that is $\frac{5}{6}$ of a yard long into 5 pieces of equal length, how long will each piece be?

4. It took Dick $\frac{2}{3}$ of an hour to answer 10 questions in a history test. If each answer required the same amount of time, how long did it take Dick to answer one question?

Practice in Dividing Fractions by Whole Numbers

Divide:

	1.	2.	3.	4.
(A)	$\frac{5}{6} \div 12$	$\frac{1}{2} \div 14$	$\frac{5}{12} \div 18$	$\frac{8}{15} \div 16$
(B)	$\frac{3}{4} \div 5$	$\frac{1}{3} \div 8$	$\frac{8}{9} \div 16$	$\frac{7}{18} \div 21$
(C)	$\frac{2}{3} \div 8$	$\frac{2}{9} \div 10$	$\frac{7}{12} \div 14$	$\frac{15}{16} \div 30$

Estimating Answers

$10 \div 2 = 5$	$50 \div 25 = 2$	$100 \div 10 = 10$
$10 \div 1 = 10$	$50 \div 50 = 1$	$100 \div 100 = 1$
$10 \div \frac{1}{2} = 20$	$50 \div \frac{1}{4} = 200$	$100 \div \frac{1}{3} = 300$

When you divide a number by a number larger than 1, the quotient is smaller than the given number.

When you divide a number by 1, the quotient is the same as the given number.

When you divide a number by a proper fraction, the quotient is larger than the given number.

Using the rules given above, choose the right answers for the following:

1.	$100 \div \frac{1}{2}$ is 50	200	500
2.	$1000 \div 50$ is 2000	20	200
3.	$96 \div 24$ is 40	104	4
4.	$59 \div 58$ is $1\frac{1}{58}$	$10\frac{1}{58}$	$\frac{58}{59}$
5.	$829 \div 1$ is 8290	829	83

Now, whenever you divide, you can decide whether or not your answer is reasonable. Even before you divide, you can tell what kind of answer you should get. Deciding what kind of answer you ought to get, or **estimating** your answer, saves many mistakes.

Comparing Numbers

What part of 4 is 2?

If you write 2 over 4 in the form of a fraction and reduce it to its lowest terms, what do you get?

What part of 8 is 6?

If you write 6 over 8 in the form of a fraction and reduce it to its lowest terms, what do you get?

How can you find what part of one number another number is?

> To find what part of one number another number is, write the first number as the numerator and the second number as the denominator and reduce the fraction to lowest terms.

Think the missing fractions.

	1.	2.
(A)	2 is $\frac{1}{2}$ of 4	3 is $\frac{3}{4}$ of 4
(B)	6 is __?__ of 10	10 is __?__ of 12
(C)	2 is __?__ of 3	9 is __?__ of 18
(D)	6 is __?__ of 9	5 is __?__ of 6
(E)	3 is __?__ of 6	8 is __?__ of 10
(F)	4 is __?__ of 5	3 is __?__ of 9
(G)	8 is __?__ of 12	4 is __?__ of 6
(H)	2 is __?__ of 6	10 is __?__ of 20
(I	4 is __?__ of 8	6 is __?__ of 8
(J)	9 is __?__ of 12	5 is __?__ of 10

Think the missing numbers.

(K) 4 is __?__ times as much as 2.
(L) 18 is __?__ times as much as 6.
(M) 36 is __?__ times as much as 4.
(N) 28 is __?__ times as much as 7.
(O) 6 is __?__ times as much as 3.
(P) 50 is __?__ times as much as 10.
(Q) 100 is __?__ times as much as 5.
(R) 60 is __?__ times as much as 12.
(S) 200 is __?__ times as much as 25.

Comparing Like Quantities

Think the right fractions or whole numbers where the question marks are.

1. 3 in. is __?__ of 12 in.
2. \$5 is __?__ times as much as \$1.25.
3. \$12 is __?__ of \$16.
4. 2 lb. is __?__ of 6 lb.
5. 160 rd. is __?__ times as much as 80 rd.
6. 15 yd. is __?__ times as much as 3 yd.
7. 4 oz. is __?__ of 16 oz.
8. 16 qt. is __?__ times as much as 4 qt.
9. 12 ft. is __?__ of 18 ft.
10. 45 min. is __?__ times as much as 15 min.

Comparing Unlike Quantities

What part of 1 ft. is 5 in.?

1 ft. = 12 in. 5 in. is $\frac{5}{12}$ of 1 ft.

> To find what part of one quantity another quantity is, change the quantities to the same unit of measure, write them as a fraction, and reduce to lowest terms.

Find the missing fractions.

1. 3 qt. is __?__ of 2 gal.
2. 8 in. is __?__ of 3 ft.
3. 75¢ is __?__ of \$3.
4. 40 min. is __?__ of 2 hr.
5. 12 oz. is __?__ of 3 lb.

Problems

1. How many pieces of fudge weighing $\frac{1}{4}$ ounce each can be made from 2 pounds of fudge?

2. A carpenter has a board that is 7 feet long. If he cuts it into pieces $\frac{1}{2}$ foot long, how many pieces will there be, not allowing for waste in sawing?

3. If 3 pounds of tea is put up in boxes holding $\frac{1}{4}$ pound each, how many boxes will there be?

Practice in Dividing Whole Numbers by Fractions

	1.	2.	3.	4.
(A)	$18 \div \frac{3}{4}$	$10 \div \frac{2}{5}$	$9 \div \frac{3}{4}$	$15 \div \frac{5}{12}$
(B)	$16 \div \frac{3}{5}$	$14 \div \frac{1}{2}$	$8 \div \frac{2}{3}$	$24 \div \frac{8}{9}$
(C)	$12 \div \frac{2}{3}$	$25 \div \frac{5}{6}$	$6 \div \frac{8}{9}$	$30 \div \frac{7}{8}$

Dividing Fractions by Fractions

How many quarter inches are there in 1 half inch? $\frac{1}{2} \div \frac{1}{4} = ?$

Does $\frac{1}{2} \div \frac{1}{4} = \frac{1}{2} \times \frac{4}{1}$?

How many $\frac{1}{8}$-inches are there in 1 half inch? $\frac{1}{2} \div \frac{1}{8} = ?$

Does $\frac{1}{2} \div \frac{1}{8} = \frac{1}{2} \times \frac{8}{1}$?

How many dimes are there in 1 half dollar? $\frac{1}{2} \div \frac{1}{10} = ?$

Does $\frac{1}{2} \div \frac{1}{10} = \frac{1}{2} \times \frac{10}{1}$?

> To divide a fraction by a fraction, invert the divisor and multiply.

Are these divided right?

$\frac{2}{3} \div \frac{3}{4} = \frac{2}{3} \times \frac{4}{3} = \frac{8}{9}$ $\quad \frac{3}{4} \div \frac{2}{3} = \frac{3}{4} \times \frac{3}{2} = \frac{9}{8} = 1\frac{1}{8}$

$\frac{3}{4} \div \frac{3}{2} = \frac{\cancel{3}^{1}}{\cancel{4}_{2}} \times \frac{\cancel{2}^{1}}{\cancel{3}_{1}} = \frac{1}{2}$ $\quad \frac{5}{6} \div \frac{10}{3} = \frac{\cancel{5}^{1}}{\cancel{6}_{2}} \times \frac{\cancel{3}^{1}}{\cancel{10}_{2}} = \frac{1}{4}$

Practice in Dividing Fractions by Fractions

Divide:

	1.	2.	3.	4.
(A)	$\frac{2}{3} \div \frac{3}{4}$	$\frac{5}{16} \div \frac{5}{8}$	$\frac{7}{12} \div \frac{7}{8}$	$\frac{3}{4} \div \frac{3}{16}$
(B)	$\frac{7}{8} \div \frac{5}{6}$	$\frac{7}{9} \div \frac{2}{3}$	$\frac{5}{24} \div \frac{15}{16}$	$\frac{14}{15} \div \frac{2}{5}$
(C)	$\frac{8}{9} \div \frac{4}{5}$	$\frac{15}{16} \div \frac{3}{4}$	$\frac{2}{3} \div \frac{1}{3}$	$\frac{1}{2} \div \frac{5}{8}$
(D)	$\frac{3}{4} \div \frac{7}{8}$	$\frac{17}{20} \div \frac{4}{5}$	$\frac{7}{9} \div \frac{7}{8}$	$\frac{5}{8} \div \frac{15}{16}$
(E)	$\frac{4}{5} \div \frac{14}{15}$	$\frac{5}{6} \div \frac{11}{12}$	$\frac{6}{7} \div \frac{3}{4}$	$\frac{19}{20} \div \frac{3}{4}$

Review of Finding Numbers When a Part Is Known

See how quickly you can answer the following questions.

	1.	2.	3.
(A)	$4 = \frac{1}{2}$ of _?_	$4 = \frac{1}{4}$ of _?_	$15 = \frac{3}{5}$ of _?_
(B)	$8 = \frac{2}{3}$ of _?_	$10 = \frac{1}{5}$ of _?_	$9 = \frac{1}{3}$ of _?_
(C)	$9 = \frac{3}{4}$ of _?_	$18 = \frac{1}{4}$ of _?_	$17 = \frac{1}{3}$ of _?_
(D)	$7 = \frac{1}{6}$ of _?_	$15 = \frac{1}{3}$ of _?_	$24 = \frac{1}{3}$ of _?_
(E)	$15 = \frac{1}{5}$ of _?_	$6 = \frac{2}{3}$ of _?_	$7 = \frac{1}{7}$ of _?_
(F)	$2 = \frac{1}{3}$ of _?_	$5 = \frac{1}{5}$ of _?_	$21 = \frac{1}{8}$ of _?_
(G)	$15 = \frac{1}{4}$ of _?_	$12 = \frac{1}{2}$ of _?_	$42 = \frac{1}{8}$ of _?_
(H)	$1 = \frac{1}{9}$ of _?_	$6 = \frac{1}{5}$ of _?_	$9 = \frac{1}{9}$ of _?_
(I)	$12 = \frac{3}{4}$ of _?_	$12 = \frac{1}{3}$ of _?_	$22 = \frac{1}{3}$ of _?_
(J)	$7 = \frac{1}{2}$ of _?_	$14 = \frac{1}{4}$ of _?_	$12 = \frac{1}{5}$ of _?_

Review of Finding What Part One Number Is of Another Number

On a sheet of paper write the missing fractions.

	1.	2.	3.
(A)	$6 =$ $\frac{1}{2}$ of 12	3 = _?_ of 9	15 = _?_ of 25
(B)	$8 =$ $\frac{2}{3}$ of 12	10 = _?_ of 25	21 = _?_ of 24
(C)	7 = _?_ of 14	6 = _?_ of 30	24 = _?_ of 28
(D)	9 = _?_ of 12	18 = _?_ of 24	9 = _?_ of 15
(E)	12 = _?_ of 16	14 = _?_ of 21	7 = _?_ of 42
(F)	5 = _?_ of 15	5 = _?_ of 10	9 = _?_ of 81
(G)	4 = _?_ of 16	12 = _?_ of 24	17 = _?_ of 51
(H)	2 = _?_ of 6	14 = _?_ of 16	11 = _?_ of 44
(I)	15 = _?_ of 20	12 = _?_ of 15	32 = _?_ of 36
(J)	1 = _?_ of 9	8 = _?_ of 28	42 = _?_ of 48

Buying Things at the Grocery Store

Below are the prices of some vegetables and fruits at the grocery store.

String beans	15¢ per lb.
Peas	20¢ per lb.
Peaches	15¢ per lb.
Apples	3 lb. for 25¢
Strawberries	25¢ per qt.
Red raspberries	40¢ per qt.
Potatoes	6 lb. for 25¢

Find the prices of the following orders:

1. To Mrs. Smith: 2 lb. of peas, 3 lb. of apples, 2 qt. of strawberries, 12 lb. of potatoes.

2. Mrs. Taylor's boarding house: 4 lb. of string beans, 5 lb. of peaches, 12 qt. of red raspberries, 48 lb. of potatoes.

3. To Mrs. Evans: 2 lb. of string beans, 2 lb. of peaches, 2 qt. of red raspberries, 6 lb. of apples.

4. To Mrs. Lawson: 3 lb. of peas, 2 lb. of peaches, 1 qt. of strawberries.

5. To the high school cafeteria: 25 lb. of peas, 18 lb. of string beans, 6 lb. of peaches, 2 crates of strawberries (1 crate = 24 qt. boxes), 3 crates of red raspberries, 60 lb. of potatoes.

Review of the Table of Weights

16 ounces (oz.) = 1 pound (lb.)
100 pounds = 1 hundredweight (cwt.)
2000 pounds = 20 hundredweight = 1 ton (T.)

1. How many ounces are there in 6 lb.? In 10 lb.? In 24 lb.?

2. How many pounds are there in 32 oz.? In 8 oz.? In 64 oz.?

3. How many pounds are there in 3 cwt.? In $\frac{1}{2}$ cwt.?

4. How many pounds are there in 2 T.? In $\frac{1}{2}$ T.? In $\frac{1}{4}$ T.? In 9 T.?

5. How many tons are there in 4000 lb.? In 3000 lb.? In 8000 lb.? In 6500 lb.?

6. A grocer bought 3 hundredweight of butter put up in pound boxes. How many boxes of butter did he buy?

7. The Parlor Market buys 2 hundredweight of lard each week. How many tons of lard does it buy in a year? (Remember, 52 weeks is a year.) How many tons of lard does it buy in six months?

8. It took four truck loads of coal to supply Mr. Jones with coal for the winter. The first truck load weighed 4600 lb.; the second load, 4200 lb.; the third, 4840 lb.; and the fourth, 4500 lb. How many tons of coal, and how many pounds over, did Mr. Jones buy?

General Practice 5

Work these examples and problems. Time, 12 minutes.

1.	2.	3.	4.
Divide:	Multiply:		Divide:
$\frac{5}{6} \div 12$	$\frac{4}{5} \times \frac{15}{16}$	100 is __?__ $\times 5$	$14 \div \frac{3}{5}$

5.	6.	7.	8.
	Divide:	Multiply:	
9 is __?__ of 54	$\frac{5}{6} \div \frac{10}{3}$	$\frac{7}{8} \times \frac{8}{7}$	1 T. = __?__ lb.

9. The area of Pennsylvania is 45,126 square miles. The area of Kentucky is 40,598 square miles. Which state is larger? How much larger?

10. How many strips of brass $\frac{3}{8}$ of an inch wide can be cut from a piece that is 13 inches wide?

11. A board is 12 inches wide. Each time it is sawed, $\frac{1}{16}$ of an inch is wasted. How much of the board is left, if two strips $1\frac{15}{16}$ inches wide are cut off?

Chapter Review

Here is a review of what you have studied in this chapter. Write the numbers 1 to 9 on a sheet of paper. After each number, write the answer to the question that has the same number.

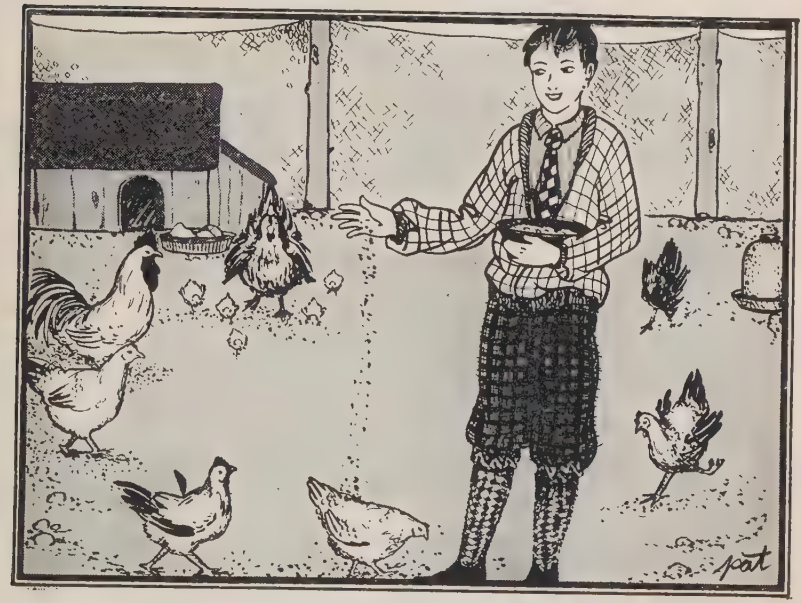
At the end of each question you will see a page number. If you missed any part of the test, turn back to the page number given after that part of the test, where you will find how to answer what you missed. Study what you missed until you are sure you know what to do. Then go back to the review and again try the part you missed. Do this until you do not miss anything or until your teacher tells you to work on something else.

1. How do you multiply fractions? (Page 68)
2. How do you write a whole number as a fraction? (Page 70)
3. How do you multiply a fraction by a whole number? (Page 70)
4. How do you multiply a whole number by a fraction? (Page 72)
5. What kind of numbers will 2 divide exactly? (Page 79)
6. What kind of numbers will 3 divide exactly? (Page 79)
7. What kind of numbers will 5 divide exactly? (Page 80)
8. (*a*) How do you divide a whole number by a fraction? (*b*) How do you divide a fraction by a whole number? (Page 85)
9. What part of 4 feet is 16 inches? (Page 89)

CHAPTER V

Adding and Subtracting Mixed Numbers

Adding Mixed Numbers



George raises chickens and sells the eggs to his neighbors. One week he sold $2\frac{3}{4}$ dozen eggs; the next week, $3\frac{1}{2}$ dozen eggs; and the next week, $2\frac{5}{6}$ dozen eggs. How many dozen eggs did George sell these three weeks all together?

What does this problem tell you?

What does this problem ask you?

To find out what this problem asks, will you subtract, multiply, add, or divide?

What kind of number is $2\frac{3}{4}$? $3\frac{1}{2}$? $2\frac{5}{6}$?

Do you know how to add mixed numbers? It is really very easy. Here is the way to do it.

$$\begin{array}{r} 2\frac{3}{4} \\ 3\frac{1}{2} \\ \underline{2\frac{5}{6}} \end{array}$$

The first thing to do is to add the fractions. You know how to do that. To add $\frac{3}{4}$, $\frac{1}{2}$, and $\frac{5}{6}$, you know that you have to do the following things:

1. Find a common denominator.
2. Change all fractions to the common denominator.
3. Add the changed fractions.
4. Change all improper fractions to whole or mixed numbers.

$$\begin{array}{rl} \frac{3}{4} & = \frac{9}{12} \\ \frac{1}{2} & = \frac{6}{12} \\ \underline{\frac{5}{6}} & = \frac{10}{12} \\ \frac{25}{12} & = 2\frac{1}{12} \end{array}$$

$$\begin{array}{rr} 2 & \\ 3 & 7 \\ \underline{2} & \underline{2\frac{1}{12}} \\ 7 & 9\frac{1}{12} \end{array}$$

By doing all these things, you see that the sum of $\frac{3}{4}$, $\frac{1}{2}$, and $\frac{5}{6}$ is $2\frac{1}{12}$.

Next you add the whole numbers. The sum of 2, 3, and 2, of course, is 7. Then you add the sum of the fractions to the sum of the whole numbers. The sum of $2\frac{1}{12}$ and 7 is $9\frac{1}{12}$.

So you see, the sum of $2\frac{3}{4}$, $3\frac{1}{2}$, and $2\frac{5}{6}$ is $9\frac{1}{12}$.

To add mixed numbers:
1. Add the fractions.
2. Add the whole numbers.
3. Add the sum of the fractions to the sum of the whole numbers.

Problems

1. Mary is taking piano lessons, and she practices at least an hour each week day. Here is the record of her practice for last week: Monday, $1\frac{1}{4}$ hours; Tuesday, $1\frac{1}{3}$ hours; Wednesday, 1 hour; Thursday, $1\frac{1}{2}$ hours; Friday, $1\frac{1}{4}$ hours; and Saturday, $1\frac{3}{4}$ hours. How many hours did Mary practice all together?

2. Henry went to a football game between his school and the Emerson School. To get to the football grounds, he walked $\frac{1}{8}$ of a mile to the street-car line, rode $1\frac{1}{4}$ miles on the street car, and then walked $\frac{1}{16}$ of a mile to the grounds. How many miles did Henry travel all together?

3. George's father runs a hotel. One day he bought 3 hams weighing $12\frac{3}{4}$ pounds, $8\frac{1}{2}$ pounds and $10\frac{5}{8}$ pounds. How many pounds did they all weigh?

4. George belongs to the Boy Scouts. In buying supplies to take to camp, he furnished $2\frac{1}{2}$ pounds of boiled ham, $1\frac{1}{2}$ pounds of sugar, $\frac{1}{2}$ pound of salt, and 2 pounds of butter. George's pack weighed 12 pounds. What was the total weight of the supplies and the pack? What did the supplies that George furnished weigh?

5. Albert goes to the Ashland Consolidated School. He walks $\frac{1}{16}$ of a mile from his home to the lane and $\frac{1}{8}$ of a mile along the lane to the bus station. Then he rides $3\frac{1}{4}$ miles on the school bus to school. How far does Albert travel to get to school?

6. Last winter Mr. Grey bought coal at three different times. The first time he bought $7\frac{1}{4}$ tons; the next time, $6\frac{3}{4}$ tons; and the last time, $5\frac{1}{2}$ tons. How many tons of coal did Mr. Grey buy last winter?

Practice in Adding Mixed Numbers

Add, and write the sums on a folded paper.

	1.	2.	3.	4.	5.
(A)	$3\frac{1}{5}$ $2\frac{2}{5}$	$7\frac{3}{4}$ $4\frac{1}{8}$	$9\frac{1}{3}$ $5\frac{2}{5}$	$4\frac{1}{6}$ $5\frac{1}{6}$	$3\frac{1}{6}$ $6\frac{1}{3}$
(B)	$4\frac{1}{3}$ $2\frac{1}{5}$ $7\frac{1}{6}$	$4\frac{2}{5}$ $1\frac{2}{5}$ $8\frac{1}{5}$	$8\frac{1}{2}$ $5\frac{1}{6}$ $4\frac{1}{3}$	$5\frac{1}{2}$ $3\frac{1}{9}$ $4\frac{1}{6}$ $2\frac{2}{9}$	$1\frac{1}{5}$ $5\frac{2}{5}$ $3\frac{1}{5}$ $6\frac{4}{5}$
(C)	$9\frac{3}{4}$ $8\frac{1}{2}$ $5\frac{1}{8}$	$3\frac{1}{4}$ $2\frac{2}{3}$ $6\frac{1}{2}$	$8\frac{2}{3}$ $9\frac{1}{2}$ $2\frac{1}{6}$	$9\frac{1}{3}$ $6\frac{1}{6}$ $3\frac{5}{8}$	$8\frac{5}{9}$ $2\frac{7}{9}$ $7\frac{1}{9}$ $2\frac{2}{9}$

Long Division Practice

Copy, and divide by long division.

	1.	2.	3.	4.	5.	6.
(A)	$12\overline{)48}$	$21\overline{)85}$	$36\overline{)72}$	$34\overline{)79}$	$82\overline{)246}$	$54\overline{)109}$
(B)	$39\overline{)117}$	$29\overline{)234}$	$75\overline{)300}$	$19\overline{)57}$	$49\overline{)245}$	$29\overline{)59}$

Problems

1. One-fourth of a quart of milk will fill a glass. How many glassfuls are there in 5 quarts of milk?

2. Harry weighed $58\frac{3}{4}$ pounds when school started in September. By Christmas he had gained $2\frac{1}{2}$ pounds. How much did he weigh then?

3. The fifth grade had a candy sale and sold candy at 60¢ a pound, as follows: $5\frac{1}{2}$ pounds of sea foam, $3\frac{3}{4}$ pounds of nut fudge, $4\frac{1}{4}$ pounds of molasses taffy, $3\frac{1}{2}$ pounds of stuffed dates, and 3 pounds of homemade chocolates. How much did the fifth grade get for all the candy?

4. If $\frac{1}{6}$ of a quart of ice cream is served to one person, how many quarts of ice cream will be needed for 24 people?

5. Betty Jane weighed $47\frac{3}{4}$ pounds on her eighth birthday. Three months later she had gained $1\frac{1}{4}$ pounds. How much did she weigh then?

Practice in Adding Mixed Numbers

Add, and write the sums on a folded paper.

	1.	2.	3.	4.	5.
(A)	$5\frac{4}{7}$	$8\frac{5}{6}$	$7\frac{2}{7}$	$5\frac{2}{9}$	$4\frac{1}{8}$
	$6\frac{2}{7}$	$5\frac{1}{12}$	$8\frac{1}{2}$	$3\frac{1}{9}$	$6\frac{3}{8}$
					$7\frac{1}{4}$
(B)	$8\frac{1}{6}$	$6\frac{2}{7}$	$7\frac{1}{2}$	$3\frac{1}{3}$	$3\frac{4}{7}$
	$4\frac{1}{3}$	$9\frac{4}{7}$	$8\frac{2}{5}$	$7\frac{1}{4}$	$4\frac{2}{7}$
	$5\frac{1}{7}$	$3\frac{1}{7}$	$1\frac{1}{10}$	$5\frac{1}{6}$	$8\frac{3}{7}$
				$9\frac{1}{4}$	$5\frac{1}{7}$
(C)	$4\frac{1}{3}$	$7\frac{2}{3}$	$5\frac{4}{9}$	$2\frac{4}{9}$	$6\frac{1}{8}$
	$9\frac{2}{9}$	$8\frac{4}{9}$	$6\frac{1}{2}$	$4\frac{1}{2}$	$3\frac{3}{8}$
	$1\frac{2}{3}$	$1\frac{2}{9}$	$7\frac{1}{6}$	$8\frac{1}{3}$	$1\frac{7}{8}$
				$1\frac{1}{9}$	$4\frac{1}{8}$

Subtracting Mixed Numbers

Mary had a piece of narrow ribbon $4\frac{1}{2}$ yards long. She cut off $2\frac{1}{2}$ yards. How many yards of ribbon were left?

What does this problem tell you?

What does this problem ask you?

To find out what this problem asks, will you multiply, add, subtract, or divide?

What kind of numbers are $4\frac{1}{2}$ and $2\frac{1}{2}$? You knew that you would have to subtract to solve this problem, didn't you? But do you know how to subtract mixed numbers? Here is the way to do it.

$4\frac{1}{2}$
$2\frac{1}{2}$
2

First, subtract the fractions in the mixed numbers. In this problem $\frac{1}{2}$ is subtracted from $\frac{1}{2}$, which leaves nothing. Then you subtract the whole numbers. In this problem the whole numbers are 4 and 2; so 2 is subtracted from 4, which leaves 2.

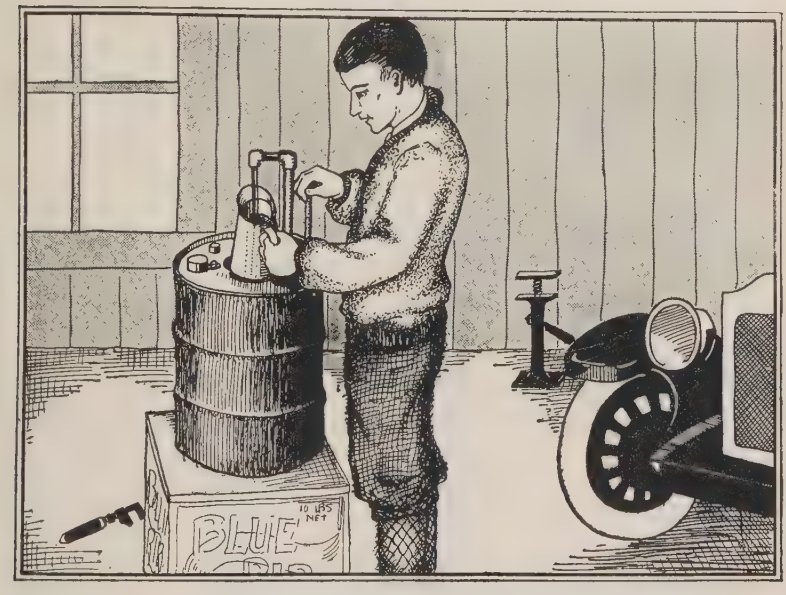
Then, $2\frac{1}{2}$ subtracted from $4\frac{1}{2}$ is 2.

Practice in Subtracting Mixed Numbers

Subtract, and write the differences on a folded paper.

	1.	2.	3.	4.	5.	6.
(A)	$5\frac{4}{5}$	$7\frac{2}{3}$	$6\frac{5}{9}$	$7\frac{6}{7}$	$9\frac{8}{15}$	$8\frac{3}{5}$
	$3\frac{1}{5}$	$4\frac{1}{3}$	$2\frac{1}{9}$	$3\frac{2}{7}$	$6\frac{2}{15}$	$5\frac{1}{5}$
(B)	$9\frac{3}{4}$	$16\frac{2}{5}$	$18\frac{3}{4}$	$15\frac{7}{8}$	$83\frac{1}{2}$	$75\frac{3}{4}$
	$5\frac{1}{2}$	$8\frac{1}{3}$	$2\frac{1}{8}$	$14\frac{1}{4}$	$\frac{1}{4}$	$18\frac{2}{3}$

Some New Work in Subtracting Mixed Numbers



Tom's father had $8\frac{1}{4}$ gallons of oil in a barrel. He took out $2\frac{3}{4}$ gallons. How many gallons of oil were left in the barrel?

In this problem, as you know, it is necessary to subtract $2\frac{3}{4}$ from $8\frac{1}{4}$. But $\frac{3}{4}$ is larger than $\frac{1}{4}$; so you need to learn something new about subtracting mixed numbers.

$$8\tfrac{1}{4} = 7\tfrac{5}{4}$$
$$\underline{2\tfrac{3}{4} = 2\tfrac{3}{4}}$$
$$5\tfrac{2}{4} = 5\tfrac{1}{2}$$

How many fourths are there in 1? Then $8\frac{1}{4} = 7\frac{5}{4}$; so the problem of subtracting $2\frac{3}{4}$ from $8\frac{1}{4}$ becomes the problem of subtracting $2\frac{3}{4}$ from $7\frac{5}{4}$. Subtracting $2\frac{3}{4}$ from $7\frac{5}{4}$, you get $5\frac{2}{4}$. But $\frac{2}{4} = \frac{1}{2}$; so the difference is $5\frac{1}{2}$.

Subtract $2\frac{7}{8}$ from $4\frac{1}{2}$.

Here is another kind of example that you need to know in subtracting mixed numbers. You will notice that the denominators are not the same. Therefore, the first thing you have to do is to change the fractions to the same denominator. Then it is necessary to borrow 1, or $\frac{8}{8}$, from the whole number of the minuend. You are now ready to solve the example as you solved other examples in subtraction of mixed numbers.

$$\begin{array}{r} 4\frac{1}{2} = 4\frac{4}{8} = 3\frac{12}{8} \\ \underline{2\frac{7}{8} = 2\frac{7}{8} = 2\frac{7}{8}} \\ 1\frac{5}{8} \end{array}$$

Practice in Subtracting Mixed Numbers

Subtract, and write the differences on a folded paper.

	1.	2.	3.	4.	5.	6.
(A)	$4\frac{1}{6}$	$7\frac{3}{10}$	$8\frac{5}{14}$	$6\frac{1}{4}$	$3\frac{3}{8}$	$7\frac{5}{8}$
	$\underline{1\frac{2}{3}}$	$\underline{6\frac{3}{5}}$	$\underline{5\frac{4}{7}}$	$\underline{\frac{1}{2}}$	$\underline{1\frac{3}{4}}$	$\underline{6\frac{11}{16}}$
(B)	11	5	$6\frac{2}{9}$	$8\frac{5}{12}$	5	8
	$\underline{10\frac{1}{2}}$	$\underline{4\frac{2}{5}}$	$\underline{4\frac{2}{3}}$	$\underline{4\frac{3}{4}}$	$\underline{2\frac{1}{2}}$	$\underline{3\frac{3}{4}}$

Subtracting Other Mixed Numbers

Subtract $4\frac{1}{3}$ from $8\frac{1}{5}$.

Here is still another kind of example you need to know how to work in subtracting mixed numbers. In this example, neither denominator is the common denominator. You have to find the common denominator.

$$\begin{array}{r} 8\frac{1}{5} = 8\frac{3}{15} = 7\frac{18}{15} \\ \underline{4\frac{1}{3} = 4\frac{5}{15} = 4\frac{5}{15}} \\ 3\frac{13}{15} \end{array}$$

Remember, in subtracting fractions, all denominators must be alike.

Practice in Subtracting Mixed Numbers

Subtract, and write the differences on a folded paper.

	1.	2.	3.	4.	5.	6.
(A)	$4\frac{1}{6}$	15	10	$3\frac{1}{4}$	$3\frac{4}{7}$	$8\frac{3}{8}$
	$\frac{2}{3}$	$4\frac{1}{5}$	$9\frac{5}{8}$	$2\frac{1}{5}$	$2\frac{2}{3}$	$6\frac{2}{3}$
(B)	$29\frac{1}{6}$	$32\frac{1}{3}$	$74\frac{1}{4}$	$52\frac{2}{5}$	$129\frac{1}{9}$	$64\frac{3}{5}$
	$14\frac{7}{8}$	$16\frac{3}{4}$	$20\frac{3}{5}$	$16\frac{1}{3}$	$73\frac{5}{7}$	$63\frac{7}{8}$

Problems

1. George helped his father put up a flag pole. It was 35 feet long, and they set it $3\frac{1}{4}$ feet in the ground. How much of the flag pole was above the ground?

2. There were $8\frac{3}{4}$ pounds of sugar in a sack. Betty used $1\frac{7}{8}$ pounds in baking. How many pounds were left in the sack?

3. A bucket filled with lard weighs 25 pounds. If the bucket alone weighs $2\frac{3}{4}$ pounds, what does the lard weigh?

How Much Baby Girls Grow

Below you will find the average height and weight of girls at different ages during the first year. Copy the tables; then find and write in the proper place the gain in height and weight each month.

Age	Height in Inches	Gain in Height	Age	Weight in Pounds	Gain in Weight
Birth	$20\frac{1}{2}$		Birth	$7\frac{1}{6}$	
6 months	$25\frac{7}{8}$		6 months	$16\frac{3}{4}$	
7 months	$26\frac{1}{2}$		7 months	$17\frac{5}{8}$	
8 months	27		8 months	$18\frac{1}{4}$	
9 months	$27\frac{5}{8}$		9 months	$19\frac{1}{8}$	
10 months	$27\frac{7}{8}$		10 months	$19\frac{1}{2}$	
11 months	$28\frac{3}{8}$		11 months	$20\frac{1}{8}$	
12 months	$28\frac{7}{8}$		12 months	$20\frac{3}{4}$	

Problems

1. Mrs. Brown paid \$65.76 for gas during the year. What was her average monthly bill?

2. Betty received \$2.00 for her birthday. She spent 20¢ for a ticket to a moving picture show and \$1.25 for a purse. How much money had she left?

3. Mr. White rented his pasture for $18 a month. How much did he receive for the pasture in 6 months?

4. James had a stand at the county fair. He needed change; so he went to the bank and got 200 pennies, 100 nickels, 50 dimes, 20 quarters, and 10 half dollars. How much money did he get?

5. Mr. Reed, the grocer, buys oranges at 42¢ per dozen and sells them at 5¢ each. How much does he make on 12 dozen oranges?

Long Division Practice

Copy these examples and divide by long division.

	1.	2.	3.
(A)	$14\overline{)98}$	$27\overline{)83}$	$15\overline{)139}$
(B)	$42\overline{)882}$	$51\overline{)1581}$	$81\overline{)5022}$
(C)	$41\overline{)6970}$	$82\overline{)30{,}750}$	$52\overline{)10{,}417}$
(D)	$39\overline{)239}$	$45\overline{)96}$	$42\overline{)168}$

General Practice 6

Work these examples and problems. Time, 12 minutes.

1.	2.	3.	4.
Add:	Subtract:	Divide:	Subtract:
$2\frac{3}{4}$	$6\frac{5}{9}$		$75\frac{3}{4}$
$3\frac{1}{2}$	$2\frac{1}{9}$	$813\overline{)166{,}665}$	$18\frac{2}{3}$
$2\frac{5}{6}$			

5.	6.	7.	8.
Subtract:	Add:	Subtract:	Subtract:
34	$9\frac{1}{3}$	$8\frac{5}{12}$	$3\frac{4}{7}$
$5\frac{7}{12}$	$6\frac{1}{6}$	$4\frac{3}{4}$	$2\frac{2}{3}$
	$3\frac{5}{8}$		

9. Laramie, Wyoming, is 7150 feet above sea level. Salt Lake City is 4251 feet above sea level. How much higher is Laramie than Salt Lake City?

10. A square farm is 160 rods on each side. How many posts, 1 rod apart, will it take to go all the way around it?

11. Mr. Johnson has a dairy farm. He weighs the milk and keeps a record for each cow. The following record is for one week for one cow: Monday, $26\frac{1}{4}$ lb.; Tuesday, $27\frac{1}{8}$ lb.; Wednesday, $26\frac{3}{4}$ lb.; Thursday, $27\frac{3}{8}$ lb.; Friday, $27\frac{1}{4}$ lb.; Saturday, $26\frac{3}{8}$ lb.; Sunday, $26\frac{3}{4}$ lb. How many pounds of milk did the cow give in one week?

12. When handkerchiefs sell at 3 for a half dollar, how much change should Mrs. Smith receive from a $5 bill if she buys a half dozen handkerchiefs?

Chapter Review

Here is a review of what you have studied in this chapter. Write the numbers 1 to 13 on a sheet of paper. After each number, write the answer to the question that has the same number.

At the end of each question you will see a page number. If you missed any part of the test, turn back

to the page number given after that part of the test, where you will find how to answer what you missed. Study what you missed until you are sure you know what to do. Then go back to the review and again try the part you missed. Do this until you do not miss anything or until your teacher tells you to work on something else.

1. What kind of numbers are $2\frac{3}{4}$, $3\frac{1}{2}$, and $2\frac{5}{6}$? (Page 98)

2. What is $\frac{3}{4} + \frac{1}{2} + \frac{5}{6}$? (Page 98)

3. What is $2 + 3 + 2$? (Page 98)

4. What is $2\frac{1}{12} + 7$? (Page 98)

5. What is $2\frac{3}{4} + 3\frac{1}{2} + 2\frac{5}{6}$? (Page 98)

6. How do you add mixed numbers? (Page 98)

7. What is $\frac{1}{2} - \frac{1}{2}$? (Page 102)

8. What is $4 - 2$? (Page 102)

9. What is $4\frac{1}{2} - 2\frac{1}{2}$? (Page 102)

10. How do you subtract mixed numbers? (Page 102)

11. Can you take $\frac{3}{4}$ from $\frac{1}{4}$? (Page 103)

12. Can you take $\frac{3}{4}$ from $1\frac{1}{4}$, or $\frac{5}{4}$? (Page 103)

13. What is $8\frac{1}{4} - 2\frac{3}{4}$? (Page 103)

PART TWO

CHAPTER VI

A Review of What You Have Learned

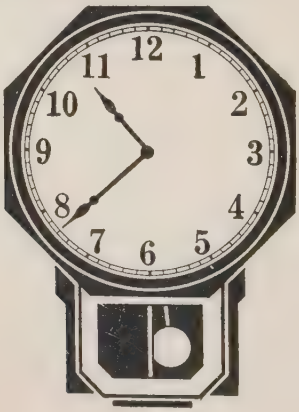
Following are some reviews of the work you have had so far in this book. See how many of these questions you can answer correctly without looking them up. If you miss any of the questions, ask your teacher to explain to you how they should have been answered.

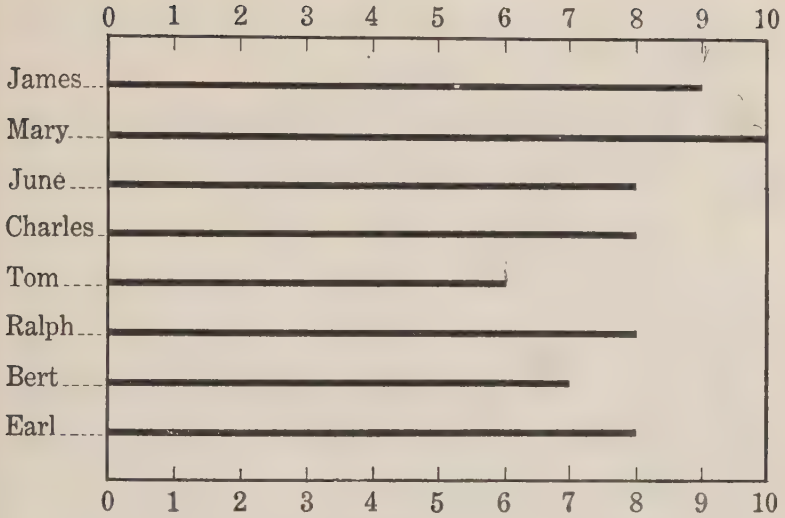
General Review

1. If the upper bar represents 1,000,000, about how much does the lower bar represent?

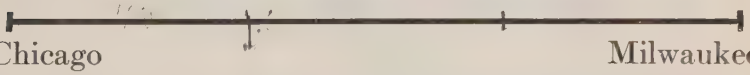
2. The sun is about ninety-two million, five hundred thousand miles from the earth. Write this number in figures.

3. What is the time on this clock?





4. The above shows how many problems each of eight pupils solved correctly in a lesson in arithmetic. Tell how many each pupil had right. What was the average number right? How many pupils are above the average? How many are below the average?



5. Measure this line. If 1 inch in the line represents 20 miles in the distance from Chicago to Milwaukee, about how far is it from Chicago to Milwaukee?

General Review

1. What is the answer in addition called? In multiplication? In subtraction? In division?

2. Which is more, $\frac{1}{8}$ or $\frac{1}{4}$?

3. How can you prove addition? Division? Multiplication? Subtraction?

4. In adding fractions, how do you find the common denominator?

5. Reduce $\frac{24}{32}$ to its lowest terms.

6. Read these numbers: 4765; 2,347,005; $18\frac{3}{4}$; 64.

7. How many square inches are there in 1 square foot?

8. What is $\frac{1}{2}$ of $\frac{1}{6}$?

9. What is $\frac{3}{4} \times \frac{5}{7}$?

10. $\frac{3}{4} \times 5 = ?$

11. $8 \times \frac{2}{3} = ?$

12. If you wish to change a recipe for 24 people to one for 9 people, what part of each article should you use?

13. What part of 14 is 8?

14. $18 \div \frac{3}{4} = ?$

15. $\frac{5}{24} \div \frac{15}{16} = ?$

16. $\frac{5}{8}$ of $\frac{16}{25} = ?$

17. What is a square inch?

18. Tell how to add mixed numbers.

Review of Addition of Fractions and Mixed Numbers

Add these fractions and mixed numbers:

	1.	2.	3.	4.	5.	6.	7.	8.
(A)	$\frac{3}{4}$ $\frac{1}{8}$	$\frac{2}{3}$ $\frac{1}{21}$ $\frac{1}{21}$	$\frac{2}{3}$ $\frac{1}{6}$	$\frac{2}{7}$ $\frac{2}{7}$ $\frac{1}{14}$	$\frac{4}{5}$ $\frac{3}{10}$	$\frac{1}{5}$ $\frac{1}{6}$	$\frac{5}{24}$ $\frac{3}{4}$	$\frac{2}{3}$ $\frac{1}{4}$
(B)	$\frac{3}{8}$ $\frac{1}{8}$	$2\frac{3}{4}$ $3\frac{1}{2}$ $2\frac{5}{6}$	$\frac{7}{12}$ $\frac{1}{12}$	$4\frac{1}{3}$ $2\frac{1}{5}$ $7\frac{1}{6}$	$\frac{1}{6}$ $\frac{1}{12}$	$9\frac{3}{4}$ $8\frac{1}{2}$ $5\frac{1}{8}$	$8\frac{2}{3}$ $9\frac{1}{2}$ $\frac{1}{6}$	$\frac{1}{3}$ $6\frac{1}{6}$ $3\frac{5}{8}$

Review of Subtraction of Fractions and Mixed Numbers

Subtract these fractions and mixed numbers:

	1.	2.	3.	4.	5.	6.	7.	8.
(A)	$\frac{6}{7}$	$\frac{7}{8}$	$\frac{11}{15}$	$\frac{7}{12}$	1	$\frac{8}{15}$	1	1
	$\frac{1}{7}$	$\frac{1}{8}$	$\frac{4}{15}$	$\frac{5}{12}$	$\frac{3}{8}$	$\frac{2}{15}$	$\frac{3}{4}$	$\frac{5}{9}$
(B)	$\frac{11}{12}$	$3\frac{3}{5}$	$\frac{4}{5}$	$\frac{1}{5}$	$4\frac{1}{2}$	$\frac{7}{9}$	12	$\frac{19}{24}$
	$\frac{1}{3}$	$3\frac{1}{5}$	$\frac{3}{10}$	$\frac{1}{8}$	$2\frac{7}{8}$	$\frac{1}{3}$	$4\frac{5}{8}$	$\frac{5}{24}$

Review of Multiplication of Fractions

Multiply these fractions and whole numbers:

	1.	2.	3.	4.
(A)	$\frac{1}{4} \times \frac{4}{9}$	$\frac{8}{9}$ of $\frac{3}{4}$	$\frac{5}{12} \times \frac{4}{5}$	$\frac{7}{16} \times \frac{8}{9}$
(B)	$\frac{7}{8} \times 42$	$36 \times \frac{7}{8}$	$\frac{5}{8}$ of 24	$\frac{7}{6} \times \frac{6}{7}$

Review of Division of Fractions

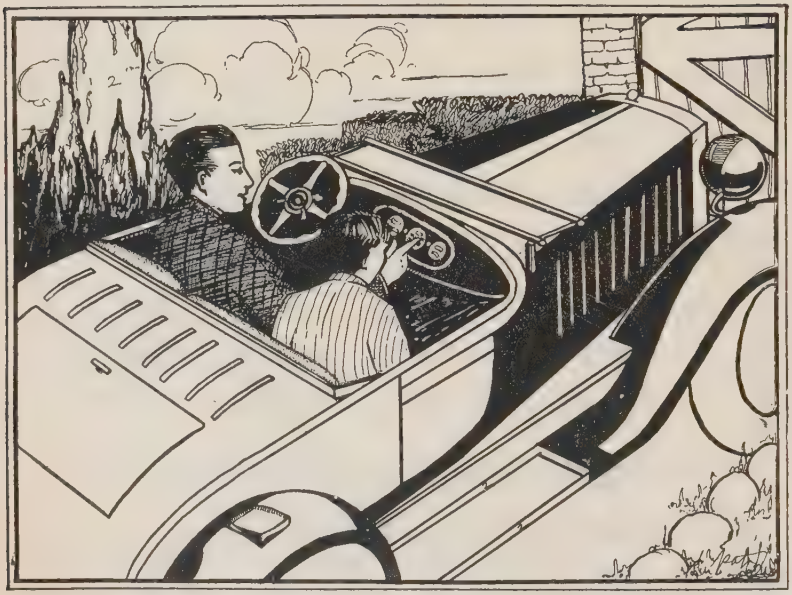
Divide these fractions and whole numbers:

	1.	2.	3.	4.
(A)	$\frac{2}{3} \div \frac{3}{4}$	$\frac{7}{9} \div \frac{2}{3}$	$8 \div \frac{2}{3}$	$\frac{3}{4} \div \frac{3}{16}$
(B)	$\frac{8}{9} \div \frac{4}{5}$	$25 \div \frac{5}{6}$	$\frac{15}{16} \div \frac{3}{4}$	$5 \div 7$

CHAPTER VII

Learning about Decimals

The Meaning of Decimals



Jack: Father, what does this number under the word "Trip" mean?

Father: That number shows how many miles we have come. This instrument is called a speedometer because, in addition to showing how many miles we have come, the upper part shows how fast we are traveling; and this part on the left shows how many miles the car has been driven since it was bought.

This morning, before we started, I set the instrument at 0 like this: 00 | 0. The 89 you see in the left of the trip number means 89 miles and the 4 means 4 tenths of a mile; so we have come $89\frac{4}{10}$ miles. You know, you learned how to read numbers like $89\frac{4}{10}$ at school. And you remember, numbers like $89\frac{4}{10}$ are called mixed numbers. In business, we have a simpler way of writing $89\frac{4}{10}$. It is like this: 89.4. The dot is the same decimal point that you used in writing dollars and cents. When written in this form, .4 is called a **decimal fraction,** or a **decimal.** Remember to read 89.4 as 89 and 4 tenths, just the way $89\frac{4}{10}$ is read.

Jack: I understand now, Father. Thank you. That is a much simpler way of writing $89\frac{4}{10}$, isn't it?

Father: Yes, it is. No doubt you will learn a great deal more about writing numbers this way at school.

One day Jack and his father took an all-day trip to a distant city. When they started, Jack's father set the trip dials at zero; thus: 00 | 0. On the way they stopped at different places, and the readings on the dials were:

	Total	Trip
At beginning of trip	4632	00. 0
At filling station	4632	00. 7
At spring	4675	43. 1
At ice cream parlor	4688	56. 0
At lunch room	4711	79. 4
At garage	4716	84. 8
At end of trip	4728	96. 1

Read the numbers on the dials and tell how many miles each place was from the beginning of the trip.

In reading, be sure to separate the whole number from the decimal fraction by **and.** Thus, 1.9 is read "one **and** nine tenths"; 8.7 is read "eight **and** seven tenths. If there is no whole number, you do not need to use "and."

A Railway Time-Table

Here is a railroad time-table. The numbers at the left of the names of the cities show the number of miles each city is from Cincinnati, Ohio.

Miles from Cincinnati	
0	Cincinnati, O.
1.8	Newport, Ky.
4.8	Latonia
21.1	Walton
39.9	Glencoe
69.6	Campbellsburg
99.2	Lakeland
113.7	Louisville
156.1	Elizabethtown
194.3	Horse Cave
198.3	Cave City
227.3	Bowling Green
248.0	Franklin
254.5	Mitchellsville, Tenn.
272.6	Gallatin
300.2	Nashville
505.6	Birmingham, Ala.
603.3	Montgomery
921.4	New Orleans, La.

How far is it from Cincinnati to Lakeland? Bowling Green? Nashville? Montgomery? New Orleans? How far are the other places from Cincinnati?

Thinking of United States Money as Decimals

How do you read \$.35? \$.75? \$1.45? \$34.50? \$247.42? You remember that \$.35 means 35 cents, and \$1.45 means 1 dollar and 45 cents. Also, \$.35 means $\frac{35}{100}$ of a dollar; \$.75 means $\frac{75}{100}$ of a dollar.

Study these:

\$.50 = 50¢ = $\frac{50}{100}$ of a dollar
\$.25 = 25¢ = $\frac{25}{100}$ of a dollar
\$.10 = 10¢ = $\frac{10}{100}$ of a dollar
\$.05 = 5¢ = $\frac{5}{100}$ of a dollar
\$.01 = 1¢ = $\frac{1}{100}$ of a dollar

Now notice these:

.50 = $\frac{50}{100}$, and is read "50 hundredths"
.25 = $\frac{25}{100}$, and is read "25 hundredths"
.10 = $\frac{10}{100}$, and is read "10 hundredths"
.05 = $\frac{5}{100}$, and is read "5 hundredths"
.01 = $\frac{1}{100}$, and is read "1 hundredth"

Reading and Writing Decimal Fractions

Fractions like $\frac{7}{10}$, $\frac{23}{100}$, and so on, that have 10, 100, 1000, etc., as denominators are called decimal fractions.

There are three ways to write fractions which have 10, 100, 1000, etc., as denominators. These fractions

may be written in words; they may be written as common fractions; and they may be written as decimal fractions.

In Words	As Common Fractions	As Decimal Fractions
Three tenths	$\frac{3}{10}$	.3
Nine tenths	$\frac{9}{10}$	.9
Fifteen hundredths	$\frac{15}{100}$	.15
Ninety-nine hundredths	$\frac{99}{100}$	.99

Look at the decimal fractions. Each number has a decimal point just before it. It shows that the decimal fraction is a fractional part of a whole number. Thus, .3 is $\frac{3}{10}$ of 1 unit, .9 is $\frac{9}{10}$ of 1 unit, .15 is $\frac{15}{100}$ of 1 unit, and .99 is $\frac{99}{100}$ of 1 unit.

In the same way, mixed numbers may be written in three ways, thus:

In Words	As Mixed Numbers	As Mixed Decimals
One and nine tenths	$1\frac{9}{10}$	1.9
Eight and seven tenths	$8\frac{7}{10}$	8.7
Forty-six and seventy-five hundredths	$46\frac{75}{100}$	46.75
Eighty-seven and fifty hundredths	$87\frac{50}{100}$	87.50

Decimal fractions are written to the right of the decimal point, and whole numbers are written to the left of the decimal point.

Read these decimals:

	1.	2.	3.	4.
(A)	.3	.25	45.82	456.72
(B)	.15	1.2	101.75	1095.2
(C)	.1	.63	9.2	18.69
(D)	.99	42.6	.01	4.17
(E)	.9	.10	1.17	152.67

General Practice 7

Work these examples and problems. Time, 12 minutes.

1.	2.	3.	4.
Add:	Write as a decimal:	Multiply:	Divide:
$3\frac{7}{8}$	Forty-seven hundredths	$\frac{7}{8} \times \frac{16}{21}$	
$\frac{2}{3}$			$47\overline{)69{,}384}$
$4\frac{1}{2}$			

5.	6.	7.	8.
Divide:	Subtract:	Add:	Divide:
$82 \div \frac{3}{4}$	$25\frac{1}{3}$	\$5.75	$\frac{2}{3} \div \frac{4}{5}$
	$\frac{7}{16}$	.92	
		1.65	
		2.37	
		.89	

9. George, Harry, and Frank were weighing one another. George weighed $87\frac{3}{4}$ pounds, Harry weighed $90\frac{1}{2}$ pounds, and Frank weighed $104\frac{5}{8}$ pounds. George said he knew how to find how much they would all weigh if they all got on the scale together. Do you? How much would they all weigh together?

10. Mr. Brown lives in the suburbs. He leaves home for his office on the 7:30 A.M. street car each week day. He gets home at 5:40 P.M. How long is he away from home each day?

11. Charles and Ralph were talking about the size of houses. Ralph said that a house that is 40′ by 40′ has the same floor space as a house 20′ by 80′. Was he right? How many square feet are there in each floor? Charles said that it was farther around the oblong house than around the square house. Was Charles right? What was the perimeter of each house?

12. If the surface of the soil washes away at an average rate of $\frac{3}{8}$ of an inch a year, how long will it take to wash away to a depth of 6 inches?

Thousandths

Any fraction with 1000 as a denominator may be written in three ways, but the best way is as a decimal.

In Words	As Common Fractions	As Decimals Fractions
One hundred twenty-five thousandths	$\frac{125}{1000}$	.125
Fourteen thousandths	$\frac{14}{1000}$	.014
Eight hundred seventy-five thousandths	$\frac{875}{1000}$	.875
Ninety-seven thousandths	$\frac{97}{1000}$	.097
Six thousandths	$\frac{6}{1000}$	.006
One thousandth	$\frac{1}{1000}$	.001

Any fraction with three figures on the right of the decimal point always represents thousandths; thus, .847 is read "eight hundred forty-seven thousandths;" .016 is read "sixteen thousandths;" and .003 is read "three thousandths."

.275 should be read "two hundred seventy-five thousandths."

200.075 should be read "two hundred and seventy-five thousandths."

In reading mixed decimals like 200.075, remember that you say "and" where the decimal point is. In reading numbers like 275, 483, or .645, you should not say "and" anywhere. These numbers should be read "two hundred seventy-five," "four hundred eighty-three," and "six hundred forty-five thousandths."

Here are some mixed numbers you should know how to read. Read them.

In Words	As Mixed Numbers	As Mixed Decimals
Two hundred forty-one and three hundred seventy-five thousandths	$241\frac{375}{1000}$	241.375
Four hundred and sixty-five thousandths	$400\frac{65}{1000}$	400.065
Six hundred and four thousandths	$600\frac{4}{1000}$	600.004

Basket-Ball Standings

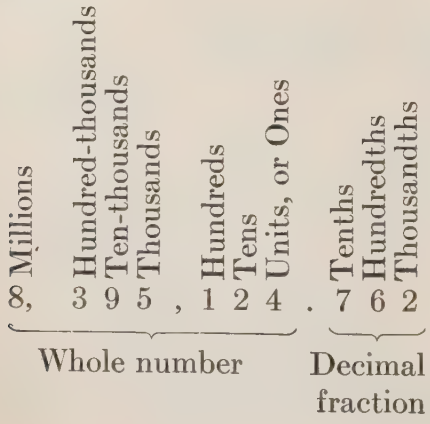
On page 122 are the standings of the basket-ball teams of the schools in the Big Ten Conference in 1928.

	Won	Lost	Standing
Indiana	10	2	.833
Purdue	10	2	.833
Northwestern	9	3	.750
Wisconsin	9	3	.750
Michigan	7	5	.583
Chicago	5	7	.417
Iowa	3	9	.250
Ohio State	3	9	.250
Illinois	2	10	.167
Minnesota	2	10	.167

The numbers in the last column show the standings of the teams in the form of decimal fractions. The first one, .833, is read "eight hundred thirty-three thousandths." Read the others.

Names of Decimal Columns

Following are the names of the different columns in numbers, both whole numbers and decimal fractions.



The names of the columns for whole numbers you already know.

The first place to the right of the decimal point is called the **tenths'** place. In the example on page 122, the 7 means seven tenths of one unit. The second place to the right is called the **hundredths'** place. In the example, the 6 means six hundredths of one unit. The third place to the right is called the **thousandths'** place. In the example, the 2 in the decimal means two thousandths of one unit. The mixed number on page 122 is read "eight million, three hundred ninety-five thousand, one hundred twenty-four and seven hundred sixty-two thousandths."

Write in figures, using decimals:

1. Five tenths
2. Thirty-seven hundredths
3. Eighty-five hundredths
4. Seven hundredths
5. Seventy-five and twenty-one hundredths
6. Eight tenths
7. Twelve and seventy hundredths
8. One hundred five and fifteen hundredths
9. One hundredth
10. Four hundred fifty and six tenths

Business Method of Reading Decimals

To save time, business men read decimals in another way. In reading 8,395,124.762, instead of saying "eight million, three hundred ninety-five thousand, one hundred twenty-four and seven hundred sixty-two thousandths," business men say "eight, three

ninety-five, one twenty-four, **point**, seven sixty-two." You will notice that the figures are merely named in groups, in their regular order, and that "point" stands for the decimal point or "and."

Read these decimals by the business method:

	1.	2.	3.
(A)	29.76	10.72	275,432.16
(B)	151.011	126.84	8953.82
(C)	15.1	9.586	6.75
(D)	21,745.109	.001	18,326.53
(E)	.05	348.22	928.625
(F)	199.99	5.8	22.375

Practice writing decimals which your teacher dictates to you by the business method.

Writing Decimals

Write as decimals:

	1.	2.	3.
(A)	$\frac{3}{100}$	$\frac{1}{1000}$	$\frac{1}{100}$
(B)	$\frac{857}{1000}$	$5\frac{22}{100}$	$\frac{50}{100}$
(C)	$\frac{1}{10}$	$\frac{3}{10}$	$52\frac{2}{10}$
(D)	$10\frac{1}{10}$	$800\frac{57}{1000}$	$\frac{9}{10}$
(E)	$\frac{14}{1000}$	$\frac{10}{100}$	$33\frac{33}{100}$
(F)	$\frac{99}{100}$	$100\frac{46}{1000}$	$\frac{427}{1000}$

General Practice 8

Work these examples and problems. Time, 12 minutes.

1.	2.	3.	4.
Add:	Add:	Subtract:	Subtract:
$5\frac{1}{3}$	\$4.08	$5\frac{1}{8}$	\$4798.00
$\frac{7}{8}$	6.28	$2\frac{5}{6}$	3989.91
$2\frac{1}{4}$	.95		
	7.78		
	11.29		

5.	6.	7.	8.
Multiply:	Divide:	Write in words:	Find:
$\frac{4}{5} \times \frac{7}{8}$	$28\overline{)84{,}459}$	.463	$\frac{5}{8}$ of $\frac{2}{3}$

9. A 25-trip ticket on a railroad costs \$51.25. What is the price per trip?

10. Harry raised 30 rows of potatoes of equal length. The first ten rows he dug yielded 27 bushels. If the other rows yielded at the same rate, how many bushels of potatoes did he raise?

11. Mr. Preston bought 25 bushels of potatoes at \$1.20 a bushel and sold them at 45¢ a peck. If one bushel spoiled and could not be sold, how much more did he receive for the potatoes than he paid for them?

12. Fred was in a pig club. When he bought his pig, it weighed 67 pounds. He fed it 120 days and weighed it again. It weighed 235 pounds. How much had it gained? What was its average daily gain?

Place Value of Digits

50.0 5.0 .5

George's motorcycle has a small instrument on it that shows how many miles he has ridden. It is called a cyclometer. In the first cyclometer shown above, how many miles are registered? How many are registered on the second cyclometer? How many miles are registered on the third cyclometer?

Does the 5 in the first cyclometer have the same value as the 5 in the second cyclometer? Does the 5 in the second cyclometer have the same value as the 5 in the third cyclometer?

The 5 in 50.0, you see, means 5 tens.

The 5 in 5.0 means 5 units.

The 5 in .5 means 5 tenths.

In the number 475.62, what does the 6 mean? The 5? The 4? The 2? The 7?

Think the right answers for these:

1. In 29.63, 2 is ___?___ ___?___; 9 is ___?___ ___?___; 6 is ___?___ ___?___; 3 is ___?___ ___?___.

2. In 473.56, 6 is __?__ __?__; 5 is __?__ __?__; 3 is ___?___ ___?___; 7 is ___?___ ___?___; 4 is __?__ ___?___.

3. In 2170.45, 2 is __?__ ___?__; 4 is __?__ __?__; 1 is ___?___ ___?___; 0 is ___?___ __?__; 5 is __?__ ___?___; 7 is ___?___ ___?___.

4. In 42,673.18, 6 is __?___ __?___; 8 is ___?___ __?__; 4 is __?__ __?__; 3 is __?__ __?__; 1 is __?__ ___?___; 7 is ___?___ ___?___; 2 is ___?___ ___?___.

5. In 386,125.79, 7 is __?__ __?__; 3 is __?__ __?__; 2 is __?__ __?__; 9 is __?__ __?__; 1 is __?__ __?__; 8 is __?__ __?__; 5 is __?__ __?__; 6 is __?__ __?__.

6. What does each 6 mean in 666.66?

7. What does each 4 mean in 4444.4?

40 is ____?____ × 4

400 is ____?____ × 40

400 is ____?____ × 4

4000 is ____?____ × 400

4000 is ____?____ × 40

4000 is ____?____ × 4

Moving a digit one place to the left multiplies the digit by 10.

Moving a digit two places to the left multiplies the digit by 100.

Moving a digit three places to the left multiplies the digit by 1000.

Annexing or Omitting Zeros

.4 .40 .400

Look at the first number, .4. Write it as the common fraction $\frac{4}{10}$. Write the second number as the common fraction $\frac{40}{100}$. Write the third number as the common fraction $\frac{400}{1000}$.

You have learned that you can divide both the numerator and denominator of a fraction by the same number without changing the value of the fraction.

If you divide both terms of $\frac{400}{1000}$ by 10, you get $\frac{40}{100}$.
If you divide both terms of $\frac{40}{100}$ by 10, you get $\frac{4}{10}$.
Then, $\frac{400}{1000} = \frac{40}{100} = \frac{4}{10}$, and

$$.400 = .40 = .4.$$

If you put a 0 to the right of .4 — that is, if you **annex** a 0 — making .40, is the value changed?

If you omit the 0's after the 4 in .400, making .4, is the value changed?

> Annexing or omitting one or more zeros to the right of a decimal fraction does not change its value.

Is .5 = .50? Is .5 = .500?
Is .470 = .47? Is .300 = .3?
Write the value of these decimals without the ending zeros:

	1.	2.	3.	4.	5.
(A)	.460	.70	.290	.30	.800
(B)	.80	.900	.620	.500	.80
(C)	.200	.50	.320	.90	.300

Subtraction Practice

Subtract, and write the differences on a folded paper.

	1.	2.	3.	4.	5.	6.
(A)	489	9069	50	583	4820	382
	313	8047	24	4	1	13
(B)	5653	5179	4739	7086	9362	824
	570	86	1582	1372	901	268

Addition Practice

Add, and write the sums on a strip of paper.

1.	2.	3.	4.	5.
11	11	101	301	3021
30	21	116	2013	1104
59	47	782	8975	2697
4	78	101	16	6535
99	43	768	8477	7617
22	10	473	4351	1071
66	58	959	1965	4884
20	76	34	3223	2400
65	45	297	9698	6938

Problems

1. James Robinson bought 5 calves at $50 each. The total cost of getting them ready for market was $245. He sold the 5 calves for $740. What was his average profit on a calf?

2. In shipping goods from New York City to San Francisco around Cape Horn, the distance is 13,090 miles. By shipping the goods through the Panama Canal, the distance is only 5278 miles. How many miles shorter is the trip through the canal?

3. The population of the United States in 1910 was 91,972,266. In 1920 it was 105,710,620. If the population increases by the same number from 1920 to 1930 that it did from 1910 to 1920, what will the population be in 1930?

4. John's father has a mileage book on the railroad. It is 129 miles from John's home to Chicago. How much mileage will be used if John's father, mother, and Aunt Sarah make a round trip to Chicago?

5. James's father is feeding 112 hogs. He feeds them 5 pounds of corn each daily. How many bushels a day is he feeding them? There are 56 pounds of corn in a bushel.

General Practice 9

Work these examples and problems. Time, 12 minutes.

1.	2.	3.	4.
Reduce to lowest terms: $\frac{48}{64}$	Add: $18\frac{2}{3}$ $5\frac{1}{6}$ $\frac{3}{5}$	Multiply: \$5.89 32	Subtract: 20,004 9,716

5.	6.	7.	8.
Find: $\frac{5}{12}$ of $\frac{2}{3}$	Multiply: 4276 438	Add: \$3.75 .95 1.80 .03 8.76	Subtract: $21\frac{2}{7}$ $5\frac{7}{8}$

9. Clarence was sent to the bank with a \$5 bill to get \$5 worth of quarters. How many quarters should he have received?

10. Grace bought 2 yards of lace at 24¢ a yard. What change should Grace have received from a $5 bill?

11. Mr. Mann, a farmer, buys his gasoline by the barrel. The tank on his tractor holds 17 gallons. How many times can he fill the tractor from a barrel holding 51 gallons?

12. Henry's father receives 85¢ an hour for his work. If he begins at 7:30 A.M. and works until 12:00 M., and then begins again at 1:00 P.M. and works until 5:30 P.M., how much does he earn in a day?

Fun with Numbers

Miss Johnson: Jane, which one of the ten figures, 0, 1, 2, 3, 4, 5, 6, 7, 8, or 9, is the hardest for you to make?

Jane: I think 8 is the hardest.

Miss Johnson: Tom, which one is the hardest for you?

Tom: The hardest one for me is 5.

Miss Johnson: Helen, which one is the hardest for you?

Helen: None of them are very hard, but I think my 7's are poorer than the others.

Miss Johnson: All right. Here is an example that will give you some practice on the figures that are hard for you. Each of you write the number 12,345,679. You can easily remember this large number if you will notice that it has all the figures 1, 2, 3, and so on, to 9, except the figure 8. Now, Jane, since 8 is the hardest figure for you to make, you multiply

12,345,679 by 72. Tom, 5 is the hardest for you; so you multiply by 45. Helen, you multiply by 63. When you are through, each of you tell me your answer.

Jane: My answer is a funny one. It is all 8's. It is 888,888,888.

Tom: My answer is funny, too. It is all 5's. It is 555,555,555.

Helen: Isn't that funny? My answer is all 7's. I have 777,777,777. I surely got some practice in making 7's. Can you do that for other numbers, Miss Johnson?

Miss Johnson: Yes, you can do it for any of the ten figures. If you want the answer to be all 2's, you multiply by 18; if you want it to be all 3's, you multiply by 27; and so on. You always multiply by 9 times the figure you want repeated in the answer.

Helen: That is a good one. I'll try that to-night on my Uncle Jim. He's always playing jokes on me. I'll just play one on him.

Buying Things for the School Playground

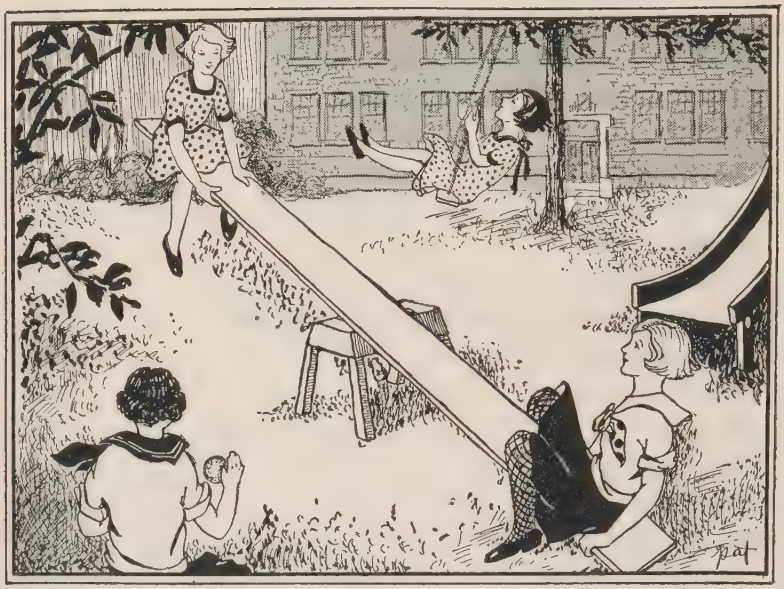
The pupils, teachers, and parents of the Washington School decided they would buy some new playground equipment. A committee from the Parent-Teachers Association found that they could get some new equipment at the following prices:

Football, "Rockne Double Laced"	$9.15
Football inflator	.50
Basket ball, "Meanwell Hidden Lace"	13.65
Basket-ball backstop	22.70
Basket-ball goals, per pair	5.05

Volley ball, "U. S. Government Special'	$4.30
Volley-ball net	1.60
Three-swing outfit, complete	65.25
Small slide	14.50
Large slide	52.50
Large slide, with wave chute	72.50
Ocean wave	56.75
Giant stride	38.75
Seesaw — three-board set — complete	79.80
Tennis net	3.35
Football pants	4.50
Football jersey	1.85
Football helmet	2.50
Football shoulder pads	2.25
Football hose	.65
Football shoes	7.50
Basket-ball shirt	.95
Basket-ball pants	1.30
Basket-ball hose	.65
Basket-ball shoes	1.80

1. To raise money to buy some of this equipment, the Parent-Teachers Association gave an entertainment and sold 765 tickets at 35¢ each and 307 tickets at 15¢ each. How much money did they get all together from the entertainment?

2. With some of the money received from the entertainment, the committee bought 1 three-swing outfit, 1 seesaw — a three-board set — 1 small slide, 1 large slide, and 1 giant stride. How much did all this equipment cost? How much money did they have left after paying for all this equipment?



3. Believing that they would need some more money to buy other equipment, the girls of the fifth grade had a candy sale and made $74.35; the boys gathered up old magazines and newspapers and sold them for $69.50; the parents had a rummage sale and made $314.25; and the owner of a near-by moving picture theater gave the school a benefit show, at which they made $427.50. How much money was earned in these four ways together?

4. Since they now had as much money as they needed, the committee decided to buy additional playground equipment, as follows: 2 large slides, with wave chutes, 1 ocean wave, 3 tennis nets, and 2 volley balls and volley-ball nets. How much did this equipment cost? How much money did the committee have left?

5. Next, the committee decided to equip completely two football teams. Accordingly, they bought for each of the 22 members 1 pair of pants, 1 jersey, 1 helmet, 2 shoulder pads, 1 pair of hose, and 1 pair of shoes. Also, they bought 2 footballs and 1 football inflator. How much did the equipment for the two teams cost? How much money did the committee have left?

6. Then the committee decided to buy outfits for two basket-ball teams. They bought 2 basket balls, 2 backstops and 2 goals; and for each of ten players they bought 1 shirt, 1 pair of pants, 1 pair of hose, and 1 pair of shoes. How much did all this basket-ball equipment cost?

7. After buying the basket-ball equipment, if the committee spends $100 in improving the football gridiron and the tennis courts and in beautifying the school grounds, how much money will the committee still have left?

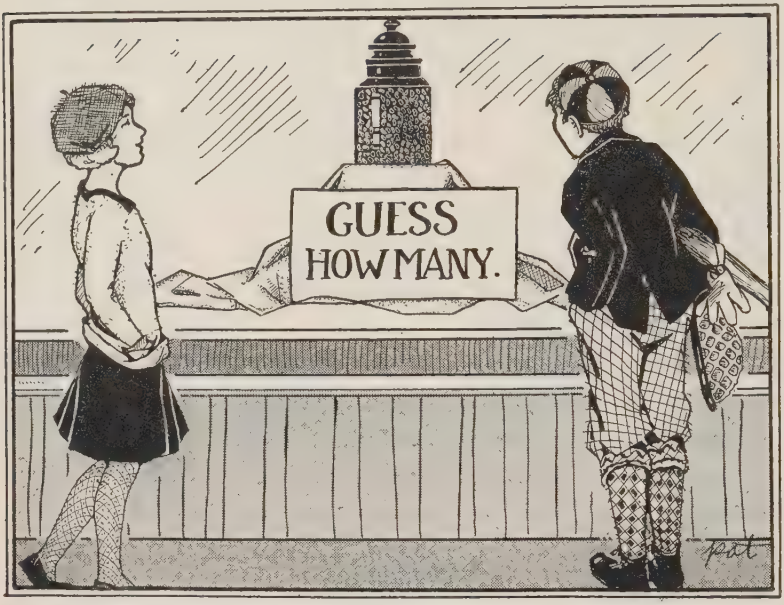
Problems

1. Mrs. Smith spent $8.75 for shoes for her daughter Grace and $1.85 for a purse for herself. When she got home, she still had $4.85. How much money had she at first?

2. The total area of Ohio in square miles is 41,040; of Indiana, 36,354; of Illinois, 56,554; of Kentucky, 40,598; and of Texas, 265,896. Which of these states is the largest? Which is larger: Ohio, Indiana, Illinois, and Kentucky, all together, or the state of Texas? How much larger?

3. Jack's father owns a house which he rents to a tenant for $45 a month. Last year Jack's father spent

for repairs $78.65, taxes $89.72, and insurance $42.50. How much did Jack's father have left from the year's rent?

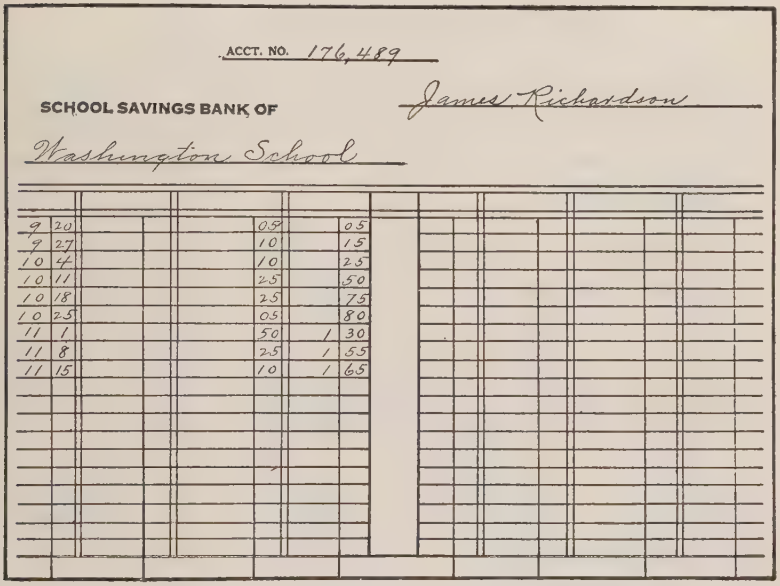


4. Helen and James were two of the many people who guessed at the number of beans in a jar in a store window. Helen guessed 1837, and James guessed 2462. There were really 2129. By how much did Helen miss the true number? By how much did James miss the true number? Whose guess was better?

Thrift

The Washington School has a school savings account. Each pupil has his own bank book. Their bank books are like their fathers' bank books. On Tuesdays the pupils bring to school the money which

they have saved during the week. The teacher enters the amount each pupil has saved in his bank book. Here is a copy of James Richardson's bank book.



ACCT. NO. 176,489

SCHOOL SAVINGS BANK OF James Richardson

Washington School

9	20				05			05			
9	27				10			15			
10	4				10			25			
10	11				25			50			
10	18				25			75			
10	25				05			80			
11	1				50		1	30			
11	8				25		1	55			
11	15				10		1	65			

Notice these facts about the bank book.

The first column shows the date on which the money was put in the bank, or **deposited.** 9/20 means the twentieth day of the ninth month, or September 20.

The next column shows how much money James deposited. On September 20 he deposited 5¢.

The last column shows the total James had in the bank after he made each deposit. Since September 20 was the first bank day, he had the same total as the amount deposited. The next week, September 27, he deposited 10¢. His total was then the sum of the

5¢ which he deposited September 20 and the 10¢ which he deposited September 27, or $.15.

Are all the totals in James's bank book correct?

Problems about Savings Accounts

1. Fred has started a savings account, which will help pay his expenses when he is ready to go to college. Here are some of the ways Fred got money for his savings account.

Nov. 20	25¢ for errands
Nov. 26 to 29	50¢ for delivering packages
Dec. 3	15¢ for helping Mother
Dec. 10 to 14	30¢ for errands
Dec. 17 to 20	75¢ for mistletoe
Dec. 25	$5.50 Christmas money

How much money did he receive between November 20 and December 25?

2. Jack Rogers had a paper route. He put one-half of his savings in his school savings account. Here are the amounts Jack earned during January and February. Make out a savings account for Jack.

Week ending Jan. 4	$.50
Week ending Jan. 11	.60
Week ending Jan. 18	.64
Week ending Jan. 25	.48
Week ending Feb. 1	.40
Week ending Feb. 8	.54
Week ending Feb. 15	.62
Week ending Feb. 22	.48

How much did Jack earn between January 1 and February 22? How much did Jack put in his school savings account?

General Practice 10

Work these examples and problems. Time, 12 minutes.

1.	2.	3.	4.
Multiply:		Add:	Divide:
$\frac{5}{6} \times \frac{14}{15}$	XXXIX =	45 $17\frac{1}{5}$ $16\frac{1}{3}$ $6\frac{5}{6}$	$27 \div \frac{3}{4}$

5.	6.	7.	8.
Divide:	Subtract:	Divide:	Multiply:
$3 \div \frac{5}{6}$	$24\frac{1}{6}$ $8\frac{4}{7}$	$\frac{5}{6} \div \frac{15}{16}$	\$7498.07 28

9. Mr. Williams owned $\frac{3}{4}$ of a store. Mr. Mathews owned $\frac{1}{4}$ of the store. Mr. Williams sold $\frac{2}{3}$ of his interest to Mr. Mathews. What part of the store does Mr. Mathews now own?

10. A man received \$31.50 for 6 days' work. What was he paid per day?

11. Two railroads hauled some merchandise a total of 360 miles. If the first railroad hauled the goods 240 miles, what part of the total distance was this? What part of the distance did the second road haul the goods?

12. There were 84 men working in a factory, but 14 of them were discharged during a dull season. What fractional part of the men continued to work?

Adding Denominate Numbers

Numbers like 4 pounds, 3 tons, 11 inches, 6 feet, 4 yards, 5 miles, 45 minutes, 7 hours, 2 pecks, 3 bushels, 2 pints, 1 quart, and 3 gallons are called **denominate numbers.**

> Any number whose units are named is a denominate number.

Name some other denominate numbers.

On Monday Mrs. Smith bought 2 quart bottles and 1 pint bottle of milk; on Tuesday she bought 1 quart and 1 pint; and on Wednesday she bought 3 quarts and 1 pint. How much milk did she buy all together?

	Quarts	Pints	
	2	1	3 pints can be changed to
	1	1	1 quart and 1 pint.
	3	1	
	6 qt.	3 pt.	= 1 qt. 1 pt.
Add	1 qt. 1 pt.		
	7 qt. 1 pt.		

Then, Mrs. Smith bought 7 quarts, 1 pint of milk all together.

Mary Jane practiced her piano lesson 1 hour and 15 minutes on Monday, 1 hour and 25 minutes on Tuesday, and 55 minutes on Wednesday. How long did she practice during the three days?

Hours	Minutes	
1	15	95 minutes can be
1	25	changed to 1 hour
2 hr.	55	and 35 minutes.
Add 1 hr. 35 min.	95 min. = 1 hr. 35 min.	
3 hr. 35 min.		

Then, Mary Jane practiced 3 hours, 35 minutes during the three days.

> To add denominate numbers, add the like terms and then change the first answer to higher denominations.

Practice in Adding Denominate Numbers

Find the sum for each of the first eight examples. In working example 8 on page 142, you will need to know that 60 seconds make 1 minute.

1.	2.	3.
1 hr. 15 min.	1 lb. 8 oz.	4 pk. 3 qt.
7 hr. 5 min.	11 lb. 2 oz.	5 pk. 2 qt.
2 hr. 50 min.	4 lb. 5 oz.	6 pk. 1 qt.

4.	5.	6.
5 gal. 2 qt. 1 pt.	2 yd. 2 ft. 9 in.	5 bu. 2 pk.
3 gal. 1 qt. 1 pt.	1 yd. 1 ft. 11 in.	1 bu. 3 pk.
4 gal. 3 qt.	3 yd. 6 in.	4 bu. 1 pk.

7.	8.
5 T. 605 lb.	4 hr. 50 min. 20 sec.
4 T. 1119 lb.	3 hr. 10 min. 30 sec.
2 T. 1075 lb.	2 hr. 40 min. 25 sec.

9. Borden's Dairy sold 3 gal. 3 qt. of milk to the White Cafeteria, 10 gal. 2 qt. to the City Ice Cream Parlor, and 5 gal. 1 qt. to the Palmer House. How much milk was sold to the three places all together?

10. Alice is trimming a dress with lace. It takes 24 in. for the neck, 1 yd. 6 in. for the sleeves, and 4 yd. 18 in. for the ruffles. How many yards of lace must she use?

11. It took four truck loads of coal to put in Mr. Brown's coal supply for the winter. The first load weighed 3 T. 715 lb.; the second load, 4 T. 112 lb.; the third load, 3 T. 1125 lb.; and the fourth load, 4 T. 28 lb. How much coal was delivered in all?

Subtracting Denominate Numbers

On Saturday morning the fruit and vegetable store had 12 bu. 2 pk. of potatoes on hand. Saturday evening all but 3 bu. 3 pk. of potatoes had been sold. How many bushels and pecks of potatoes had been sold?

12 bu. 2 pk. = 11 bu. 6 pk.
3 bu. 3 pk. = 3 bu. 3 pk.
8 bu. 3 pk.

8 bu. 3 pk. of potatoes had been sold.

Mary has a scarf 4 ft. 3 in. long. Alice's scarf is 3 ft. 9 in. long. How much longer is Mary's scarf?

4 ft. 3 in. = 3 ft. 15 in.
3 ft. 9 in. = 3 ft. 9 in.
6 in.

Mary's scarf is 6 in. longer than Alice's scarf.

Practice in Subtracting Denominate Numbers

Find the difference for each of the first eight examples.

1.	2.	3.
8 hr. 30 min.	20 bu. 1 pk.	3 yd. 1 ft.
7 hr. 20 min.	10 bu. 3 pk.	2 yd. 2 ft.

4.	5.	6.
5 gal. 3 qt. 1 pt.	40 lb. 2 oz.	39 rd. 2 yd.
3 gal. 2 qt. 1 pt.	34 lb. 14 oz.	16 rd. 5 yd.

7.	8.
10 T. 1049 lb.	4 bu. 3 pk. 4 qt.
5 T. 1864 lb.	2 bu. 2 pk. 7 qt.

9. Tom is 4 ft. 3 in. tall. Jack is 3 ft. 11 in. tall. How much taller is Tom?

10. A farmer loaded his wagon with wheat and drove to the grain elevator. His wagon loaded with wheat weighed 1 ton, 1635 pounds. After the wheat had been emptied into the elevator, the wagon weighed 1060 pounds. How much did the wheat weigh?

11. Dick had a piece of lumber 4 ft. 5 in. long. He used 3 ft. 9 in. in making a bird house. How long was the piece of lumber that was left?

12. Ruth bought 5 lb. of sugar. She used 1 lb. 8 oz. in making a cake. How much sugar was left?

Chapter Review

Here is a review of what you have studied in this chapter. Write the numbers 1 to 16 on a sheet of paper. After each number, write the answer to the question that has the same number.

At the end of each question you will see a page number. If you missed any part of the test, turn back to the page number given after that part of the test, where you will find how to answer what you missed. Study what you missed until you are sure you know what to do. Then go back to the review and again try the part you missed. Do this until you do not miss anything or until your teacher tells you to work on something else.

1. Read this number: 89.4. (Page 115)

2. Read this number: .35. (Page 117)

3. Read this number: 1.45. (Page 118)

4. On which side of the decimal point are decimal fractions written? (Page 118)

5. On which side of the decimal point are whole numbers written? (Page 118)

6. Read this number: .275. (Page 121)

7. Read this number: 200.075. (Page 121)

8. Name all the columns of numbers from units to millions. (Page 122)

9. Name the columns of decimals from tenths to thousandths. (Page 122)

10. How does a business man read the number 8,395,124.762? (Page 123)

11. In the number 475.62, what does the 5 mean? The 4? The 6? The 7? The 2? (Page 126)

12. What is the effect of moving a digit one place to the left? (Page 127)

13. What is the effect of moving a digit two places to the left? (Page 127)

14. What is the effect of moving a digit three places to the left? (Page 127)

15. What is the effect of writing a 0 on the right of a decimal fraction? (Page 128)

16. What is the effect of omitting a 0 on the right of a decimal fraction? (Page 128)

CHAPTER VIII

Multiplying and Dividing Fractions and Mixed Numbers

Multiplying Mixed Numbers by Whole Numbers

How much are 3 half dollars worth?
What is $3 \times \$\frac{1}{2}$?
What is $3 \times \$2$?
What is $3 \times \$2\frac{1}{2}$?
Is $3 \times 2\frac{1}{2} = \frac{3}{1} \times \frac{5}{2}$?
What is $\frac{3}{1} \times \frac{5}{2}$?
How can you multiply a mixed number by a whole number?

> To multiply a mixed number by a whole number, change the mixed number to an improper fraction, write the whole number as a fraction with 1 as the denominator, and multiply as in multiplying fractions. Use cancellation if you can.

Multiply $2\frac{1}{2}$ by 4.

$$2\tfrac{1}{2} = \tfrac{5}{2} \qquad 2\tfrac{1}{2} \times 4 = \tfrac{5}{\cancel{2}} \times \tfrac{\overset{2}{\cancel{4}}}{1} = \tfrac{10}{1} = 10$$

Do you see that $2\frac{1}{2} = \frac{5}{2}$? Is $2\frac{1}{2} \times 4$ just the same as $\frac{5}{2} \times \frac{4}{1}$? What is $\frac{5}{2} \times \frac{4}{1}$? What is $2\frac{1}{2} \times 4$?
Is $3 \times 4 = 4 \times 3$?
Is $3 \times 4\frac{1}{2} = 4\frac{1}{2} \times 3$?

$3 \times 4\frac{1}{2} = \frac{3}{1} \times \frac{9}{2} = \frac{27}{2} = 13\frac{1}{2}$
$4\frac{1}{2} \times 3 = \frac{9}{2} \times \frac{3}{1} = \frac{27}{2} = 13\frac{1}{2}$

To multiply a whole number by a mixed number, write the whole number as a fraction with 1 as the denominator, change the mixed number to an improper fraction, and multiply as in multiplying fractions. Always cancel if possible.

Multiply these:

	1.	2.	3.	4.
(A)	$3\frac{2}{3} \times 4$	$3 \times 4\frac{7}{8}$	$3\frac{1}{2} \times 8$	$4\frac{1}{2} \times 5$
(B)	$4 \times 3\frac{1}{3}$	$6 \times 2\frac{2}{9}$	$3 \times 9\frac{5}{6}$	$5\frac{1}{4} \times 6$

Another Way of Multiplying Mixed Numbers by Whole Numbers

Multiply $5\frac{1}{2}$ by 4.

WORK

$5\frac{1}{2}$
4
2
20
22

$\frac{1}{2}$ of 4 = 2; or $4 \times \frac{1}{2} = \frac{4}{2}$, or 2. Write 2 under the 4. $4 \times 5 = 20$. Write 20 as the second partial product. Adding the 2 and 20, you get 22. Then, $5\frac{1}{2} \times 4 = 22$.

Multiply 8 by $3\frac{1}{2}$.

WORK

8
$3\frac{1}{2}$
4
24
28

$\frac{1}{2}$ of 8 (or $\frac{1}{2} \times 8$) = 4. Write 4. $3 \times 8 = 24$. Write 24. Adding 4 and 24, you get 28. Then, $8 \times 3\frac{1}{2} = 28$.

To multiply a whole number and a mixed number, multiply the whole number and the fraction in the mixed number, multiply the whole numbers, and add.

Multiply these by the new method:

	1.	2.	3.	4.
(A)	$10\frac{1}{2} \times 2$	$5 \times 7\frac{1}{2}$	$4\frac{1}{5} \times 8$	$25\frac{1}{4} \times 11$
(B)	$28\frac{1}{4} \times 12$	$1\frac{1}{5} \times 3$	$6 \times 22\frac{1}{3}$	$9 \times 16\frac{1}{6}$

Problems

Mr. White owns a small farm near Denver. One Saturday morning he loaded his automobile full of produce to be sold at the public market. He received the following prices for his produce. Find how much money he received for each (figuring to the nearest cent) and how much money he received all together.

1. $5\frac{1}{4}$ lb. of butter at 43¢ per lb.
2. $28\frac{1}{2}$ lb. of chicken at 31¢ per lb.
3. $15\frac{1}{4}$ lb. of lard at 25¢ per lb.
4. $45\frac{1}{2}$ lb. of tomatoes at 12¢ per lb.
5. 30 lb. of string beans at 3 lb. for 25¢.
6. 100 lb. of potatoes at $6\frac{1}{4}$¢ per lb.
7. 5 bu. of peaches at $.75 a pk.

Before Mr. White went home, he bought the following supplies. Find how much he paid for these supplies. How much more did Mr. White receive for his produce than he paid for supplies?

8. $3\frac{1}{2}$ lb. of roast beef at 28¢ per lb.
9. $2\frac{3}{4}$ lb. of bacon at 36¢ per lb.
10. 25 lb. of sugar at $6\frac{1}{4}$¢ per lb.
11. 5 lb. of coffee at 48¢ per lb.
12. 5 gal. of automobile oil at 25¢ per qt.

General Practice 11

Work these examples and problems. Time, 12 minutes.

1.	2.	3.	4.
Multiply:	Divide:	Multiply:	Add:
$4 \times 8\frac{5}{6}$	$\frac{7}{8} \div \frac{3}{4}$	$\frac{6}{7} \times \frac{3}{4}$	$\frac{3}{4}$ $5\frac{7}{8}$ $17\frac{2}{3}$ $9\frac{1}{5}$

5.	6.	7.	8.
Find:	Divide:	Multiply:	Subtract:
$\frac{2}{3}$ of $\frac{7}{2}$	$38\overline{)39{,}147}$	$25\frac{1}{4} \times 11$	$9\frac{1}{3}$ $4\frac{5}{8}$

9. There are 180 trees in an orchard; 72 of them are apple trees, 48 of them are peach trees, 45 of them are pear trees, and 15 of them are cherry trees. What fractional part of the whole orchard is each kind of tree?

10. Peg lives $\frac{3}{4}$ of a mile from school. She walks to school and home once each day. How many miles does she walk to and from school in a week?

11. Which is greater, $\frac{5}{7}$ or $\frac{7}{11}$? How much?

12. One day George said to the class: "Choose any number; multiply it by 4; add 18; divide by 2; and subtract 2 times the first number. All of you now have 9." Choose a number, any number, follow George's directions, and see whether he was right.

Multiplying Mixed Numbers by Fractions

Multiply $8\frac{2}{3}$ by $\frac{3}{4}$.

$$8\tfrac{2}{3} \times \tfrac{3}{4} = \frac{\overset{13}{\cancel{26}}}{\cancel{3}} \times \frac{\cancel{8}}{\cancel{4}_{2}} = \tfrac{13}{2} = 6\tfrac{1}{2}$$

You can change $8\frac{2}{3}$ to $\frac{26}{3}$. Then you can multiply $\frac{26}{3}$ by $\frac{3}{4}$. Canceling the 3's, canceling 2 into 26 and 4, and multiplying, you should get $\frac{13}{2}$, or $6\frac{1}{2}$.

Multiply $\frac{6}{7}$ by $4\frac{2}{3}$.

$$\tfrac{6}{7} \times 4\tfrac{2}{3} = \frac{\overset{2}{\cancel{6}}}{7} \times \frac{\overset{2}{\cancel{14}}}{\cancel{3}} = \tfrac{4}{1} = 4$$

Change $4\frac{2}{3}$ to $\frac{14}{3}$ and multiply $\frac{6}{7}$ by $\frac{14}{3}$. Cancel the 7 into 14 and cancel the 3 into 6. Multiplying, you get $\frac{4}{1}$, or 4. Remember, when all the denominators cancel out, the denominator of the answer is 1. The above example really means $\frac{\overset{2}{\cancel{6}}}{7} \times \frac{\overset{2}{\cancel{14}}}{\cancel{3}} = \frac{4}{1}$, which, you see, gives 4. As you know, you do not write the 1's you get in canceling. If everything cancels out, the answer is 1.

> To multiply a mixed number and a fraction, change the mixed number to an improper fraction and multiply as in multiplying fractions. Cancel whenever you can.

Multiply these:

	1.	2.	3.	4.
(A)	$6\frac{2}{3} \times \frac{3}{5}$	$\frac{2}{3}$ of $12\frac{1}{2}$	$\frac{4}{5} \times 1\frac{2}{3}$	$18\frac{3}{4} \times \frac{1}{7}$
(B)	$31\frac{1}{4} \times \frac{2}{3}$	$1\frac{1}{6} \times \frac{6}{7}$	$\frac{4}{5}$ of $3\frac{1}{8}$	$\frac{3}{4} \times 8\frac{1}{3}$
(C)	$3\frac{3}{7} \times \frac{5}{8}$	$\frac{2}{3}$ of $16\frac{2}{3}$	$2\frac{1}{2} \times \frac{2}{5}$	$2\frac{1}{2} \times \frac{5}{2}$

Multiplying Mixed Numbers by Mixed Numbers

Multiply $2\frac{5}{8}$ by $4\frac{2}{3}$.

$$2\tfrac{5}{8} = \tfrac{21}{8} \qquad 4\tfrac{2}{3} = \tfrac{14}{3}$$

$$\tfrac{21}{8} \times \tfrac{14}{3} = \tfrac{\cancel{21}^{7}}{8} \times \tfrac{\cancel{14}^{7}}{\cancel{3}} = \tfrac{49}{4} = 12\tfrac{1}{4}$$

Change the mixed numbers to improper fractions. Cancel where you can. Write the product of the numerators over the product of the denominators. Reduce to lowest terms.

> To multiply mixed numbers, change the mixed numbers to improper fractions. Cancel and multiply as in multiplying fractions.

Multiply these:

	1.	2.	3.	4.
(A)	$2\frac{2}{5} \times 4\frac{3}{8}$	$4\frac{1}{2} \times 5\frac{3}{9}$	$3\frac{1}{5} \times 2\frac{5}{8}$	$6\frac{1}{4} \times 3\frac{3}{5}$
(B)	$7\frac{1}{3} \times 10\frac{1}{2}$	$14\frac{2}{3} \times 3\frac{5}{6}$	$3\frac{2}{3} \times 9\frac{3}{5}$	$8\frac{5}{8} \times 3\frac{5}{6}$
(C)	$9\frac{1}{3} \times 9\frac{3}{4}$	$16\frac{2}{3} \times 18\frac{3}{4}$	$1\frac{2}{3} \times 6\frac{1}{4}$	$10\frac{1}{2} \times 6\frac{2}{3}$

Dividing Mixed Numbers by Whole Numbers

Divide $15\frac{3}{4}$ by 9.

$$15\tfrac{3}{4} \div 9 = \tfrac{63}{4} \div \tfrac{9}{1} = \tfrac{\overset{7}{\cancel{63}}}{4} \times \tfrac{1}{\cancel{9}} = \tfrac{7}{4} = 1\tfrac{3}{4}$$

Changing $15\frac{3}{4}$ to an improper fraction, you get $\frac{63}{4}$. As you have already learned, dividing by 9 is the same as multiplying by $\frac{1}{9}$. Multiplying $\frac{63}{4}$ by $\frac{1}{9}$ and using cancellation, you get $\frac{7}{4}$, which should be changed to $1\frac{3}{4}$. Then, $15\frac{3}{4} \div 9 = 1\frac{3}{4}$.

> To divide a mixed number by a whole number, change the mixed number to an improper fraction, invert the divisor, and multiply as in multiplying fractions.

Copy the examples below and finish the work.

	1.	2.
(A)	$5\frac{1}{2} \div 2 = \frac{11}{2} \times \frac{1}{\ }$	$13\frac{1}{3} \div 5 = \frac{40}{3} \times \frac{1}{\ }$
(B)	$5\frac{3}{4} \div 4 = \frac{23}{4} \times \frac{1}{\ }$	$18\frac{3}{4} \div 10 = \frac{75}{4} \times \frac{1}{\ }$

Practice in Dividing Mixed Numbers by Whole Numbers

Now work these by yourself:

	1.	2.	3.	4.
(A)	$2\frac{1}{2} \div 3$	$2\frac{1}{2} \div 5$	$9\frac{2}{3} \div 9$	$3\frac{3}{8} \div 5$
(B)	$5\frac{7}{8} \div 4$	$9\frac{3}{5} \div 3$	$7\frac{3}{4} \div 7$	$9\frac{5}{9} \div 5$
(C)	$7\frac{7}{32} \div 5$	$8\frac{1}{6} \div 7$	$5\frac{7}{8} \div 5$	$8\frac{7}{10} \div 6$

Dividing Whole Numbers by Mixed Numbers

Divide 7 by $4\frac{1}{2}$.

$$7 \div 4\tfrac{1}{2} = \tfrac{7}{1} \div \tfrac{9}{2} = \tfrac{7}{1} \times \tfrac{2}{9} = \tfrac{14}{9} = 1\tfrac{5}{9}$$

First change $4\frac{1}{2}$ to an improper fraction. This gives $\frac{9}{2}$. Since dividing by a number is the same as multiplying by that number inverted, to find $7 \div \frac{9}{2}$ you multiply 7 by $\frac{2}{9}$. Multiplying, you get $\frac{14}{9}$, which should be changed to $1\frac{5}{9}$. Then, $7 \div 4\frac{1}{2} = 1\frac{5}{9}$.

> To divide a whole number by a mixed number, change the mixed number to an improper fraction, invert the divisor, and multiply.

Practice in Dividing Whole Numbers by Mixed Numbers

Divide these:

	1.	2.	3.	4.
(A)	$3 \div 5\frac{1}{16}$	$4 \div 3\frac{2}{9}$	$6 \div 7\frac{1}{2}$	$3 \div 6\frac{1}{4}$
(B)	$2 \div 7\frac{1}{8}$	$5 \div 8\frac{9}{32}$	$9 \div 9\frac{2}{3}$	$5 \div 8\frac{7}{8}$
(C)	$4 \div 4\frac{8}{9}$	$2 \div 4\frac{2}{5}$	$6 \div 2\frac{2}{3}$	$6 \div 7\frac{7}{8}$

Problems

1. Mr. Thomas bought four loads of coal, as follows: 4170 lb., 3980 lb., 4020 lb., and 4260 lb. This was how many tons and how many pounds over?

2. The sales in a store were: Monday, $265.37; Tuesday, $87.50; Wednesday, $298.75; Thursday,

$178.60; Friday, $165.92; and Saturday, $381.56. What were the total sales for the week?

3. In driving from Kentucky to Colorado in an automobile, Jack's father drove as follows: Tuesday, 262 miles; Wednesday, 283 miles; Thursday, 258 miles; Friday, 310 miles; and Saturday, 347 miles. How many miles did Jack's father travel all together, and how many miles did he average each day?

4. Mrs. Bradley bought 24 dozen eggs at 28 cents a dozen and packed them for use in the winter. If the average price of eggs in the winter was 48 cents a dozen, how much did Mrs. Bradley save on the cost of the eggs by buying when they were cheap?

5. Make up a problem in which you have to add some numbers, and solve your own problem.

6. Make up a problem in which you have to multiply some numbers, and solve your own problem.

7. Make up a problem in which you have to divide some numbers, and solve your own problem.

8. Make up a problem in which you have to subtract some numbers, and solve your own problem.

9. By working after school and on Saturday, Harry earns \$5.50 a week running a delivery truck for the grocer. Harry wants to buy a radio for his father and mother which will cost \$112.50. If he saves all but a dollar of what he earns each week, on the average, how many weeks will it take him to save enough to buy the radio?

10. Mr. Gentry sold 10 fat hogs, averaging 208 pounds each, at 9¢ a pound. How much did he receive for the hogs?

Dividing Mixed Numbers by Fractions

Divide $12\frac{1}{2}$ by $\frac{2}{3}$.

$$12\tfrac{1}{2} \div \tfrac{2}{3} = \tfrac{25}{2} \times \tfrac{3}{2} = \tfrac{75}{4} = 18\tfrac{3}{4}$$

Changing $12\frac{1}{2}$ to an improper fraction, you get $\frac{25}{2}$. Multiplying $\frac{25}{2}$ by $\frac{3}{2}$ ($\frac{2}{3}$ inverted), you get $\frac{75}{4}$, which should be changed to $18\frac{3}{4}$. Then, $12\frac{1}{2} \div \frac{2}{3} = 18\frac{3}{4}$.

> To divide a mixed number by a fraction, change the mixed number to an improper fraction, invert the divisor, and multiply.

Practice in Dividing Mixed Numbers by Fractions

Divide the following fractions and mixed numbers. See that your answer is in its simplest form.

	1.	2.	3.	4.
(A)	$3\frac{1}{2} \div \frac{3}{4}$	$5\frac{1}{3} \div \frac{2}{3}$	$1\frac{5}{6} \div \frac{2}{3}$	$6\frac{2}{5} \div \frac{4}{7}$
(B)	$2\frac{3}{4} \div \frac{1}{2}$	$8\frac{1}{7} \div \frac{3}{7}$	$1\frac{7}{9} \div \frac{8}{9}$	$4\frac{1}{2} \div \frac{2}{3}$
(C)	$8\frac{2}{9} \div \frac{2}{3}$	$3\frac{2}{3} \div \frac{2}{9}$	$5\frac{1}{4} \div \frac{3}{4}$	$4\frac{1}{5} \div \frac{3}{10}$
(D)	$7\frac{1}{2} \div \frac{5}{6}$	$10\frac{1}{2} \div \frac{7}{8}$	$4\frac{2}{9} \div \frac{2}{3}$	$15\frac{3}{4} \div \frac{7}{8}$

Dividing Fractions by Mixed Numbers

Divide $\frac{5}{9}$ by $3\frac{5}{6}$.

$$\frac{5}{9} \div 3\frac{5}{6} = \frac{5}{9} \div \frac{23}{6} = \frac{5}{\cancel{9}_{3}} \times \frac{\cancel{6}^{2}}{23} = \frac{10}{69}$$

Changing $3\frac{5}{6}$ to an improper fraction, you get $\frac{23}{6}$. Multiplying $\frac{5}{9}$ by $\frac{6}{23}$ ($\frac{23}{6}$ inverted), you get $\frac{10}{69}$. Then, $\frac{5}{9} \div 3\frac{5}{6} = \frac{10}{69}$.

> To divide a fraction by a mixed number, change the mixed number to an improper fraction, invert the divisor, and multiply.

Practice in Dividing Fractions by Mixed Numbers

Divide these:

	1.	2.	3.	4.
(A)	$\frac{1}{4} \div 3\frac{2}{3}$	$\frac{3}{5} \div 6\frac{9}{10}$	$\frac{9}{16} \div 2\frac{5}{32}$	$\frac{7}{8} \div 4\frac{3}{5}$
(B)	$\frac{7}{9} \div 8\frac{1}{2}$	$\frac{7}{8} \div 6\frac{1}{8}$	$\frac{3}{8} \div 8\frac{5}{16}$	$\frac{2}{3} \div 6\frac{3}{8}$
(C)	$\frac{1}{2} \div 3\frac{1}{4}$	$\frac{7}{9} \div 8\frac{3}{10}$	$\frac{4}{9} \div 6\frac{2}{3}$	$\frac{3}{4} \div 7\frac{1}{2}$
(D)	$\frac{5}{8} \div 3\frac{3}{4}$	$\frac{5}{9} \div 5\frac{3}{32}$	$\frac{2}{9} \div 9\frac{2}{5}$	$\frac{3}{8} \div 8\frac{7}{16}$

Problems

1. Grace, Kate, Tom, and Jack thought it would be great fun to run a stand and sell ice cream cones on circus day. So they arranged with a dealer to take 30 gallons of ice cream, and it was understood that they could return all that they did not sell. They sold all but 3 gallons, which they returned. How many gallons did they sell? What did it cost them at $1.35 a gallon?

2. In the problem above, if the children took in $53.50, paid out $5.25 for cones, paid the dealer for the ice cream they sold, and divided the balance equally, how much did each of them get?

3. Last year I averaged $2\frac{1}{2}$ acres a day in my plowing. If I do the same this year, how many acres can I plow in $4\frac{1}{2}$ days?

4. The Jefferson School has a fire drill at least once each month. In September it took 2 minutes, 37 seconds to empty the building. In October it took 1 minute, 22 seconds. How much more quickly did they empty the building in October?

5. Just before Christmas Mary opened her bank and found that she had 5 half dollars, 7 quarters, 12 dimes, 19 nickels, and 34 pennies. How much money had she in all?

Dividing Mixed Numbers by Mixed Numbers

Divide $2\frac{1}{3}$ by $1\frac{3}{4}$.

$$2\tfrac{1}{3} \div 1\tfrac{3}{4} = \tfrac{7}{3} \div \tfrac{7}{4} = \tfrac{\cancel{7}}{3} \times \tfrac{4}{\cancel{7}} = \tfrac{4}{3} = 1\tfrac{1}{3}$$

$2\frac{1}{3} = \frac{7}{3}$ $\quad 1\frac{3}{4} = \frac{7}{4}$ Dividing $\frac{7}{3}$ by $\frac{7}{4}$ is equal to multiplying $\frac{7}{3}$ by $\frac{4}{7}$. Multiplying, you get $\frac{4}{3}$, or $1\frac{1}{3}$. Then, $2\frac{1}{3} \div 1\frac{3}{4} = 1\frac{1}{3}$.

> To divide a mixed number by a mixed number, change them to improper fractions, invert the divisor, and multiply.

Practice in Dividing Mixed Numbers by Mixed Numbers

Divide these:

	1.	2.	3.
(A)	$3\frac{3}{4} \div 3\frac{3}{8}$	$7\frac{1}{5} \div 1\frac{4}{5}$	$19\frac{1}{2} \div 10\frac{7}{12}$
(B)	$2\frac{1}{2} \div 5\frac{3}{4}$	$8\frac{5}{12} \div 2\frac{2}{5}$	$5\frac{2}{9} \div 3\frac{1}{2}$
(C)	$6\frac{3}{8} \div 4\frac{3}{4}$	$6\frac{1}{4} \div 5\frac{1}{2}$	$12\frac{2}{5} \div 8\frac{1}{4}$
(D)	$5\frac{1}{4} \div 7\frac{7}{8}$	$9\frac{1}{3} \div 7\frac{3}{7}$	$10\frac{1}{5} \div 1\frac{7}{10}$

General Practice 12

Work these examples and problems. Time, 12 minutes.

1.	2.	3.	4.
Divide:	Add:	Multiply:	Subtract:
$1\frac{5}{6} \div \frac{2}{3}$	$5\frac{1}{2}$	$5\frac{3}{4} \times 2\frac{2}{3}$	$52\frac{1}{3}$
	$\frac{7}{8}$		$17\frac{5}{7}$
	$4\frac{1}{3}$		

5.	6.	7.	8.
Add:	Multiply:	Divide:	Subtract:
\$5.27	5726	$9\frac{1}{3} \div 7\frac{3}{7}$	200,000
6.53	853		51,426
10.00			
8.75			
.92			
5.67			

9. George weighed $79\frac{7}{8}$ pounds in September when school opened. The first of December he weighed $81\frac{1}{4}$ pounds. Did he gain or lose in weight during this time? How much?

10. Some kinds of carpets are made of strips that are $\frac{3}{4}$ of a yard wide. How many strips would be needed for a room that is 18 feet wide?

11. On the average, $\frac{1}{16}$ of the weight of an animal used for beef is hide. If such an animal weighed 1008 pounds, how much would the owner receive for its hide at $16\frac{2}{3}$ cents a pound?

12. On Saturday morning 9 coal trains passed through Pineville. Each train had 53 cars of coal. How many cars of coal were there in the 9 trains?

Problems about Automobiles

1. Mr. Jones's car holds 15 gallons of gasoline. He found that he drove $172\frac{1}{2}$ miles on that amount of gasoline. How many miles did he average per gallon?

2. Mr. Smith buys oil by the barrel for his auto trucks. How long will a 50-gallon barrel of oil last if $3\frac{1}{4}$ quarts are used each day?

3. On an automobile trip Mr. Brown bought 15 gallons of gasoline the first day; 20 gallons the second day; and 12 gallons the third day. If the gasoline cost $22\frac{1}{2}$ cents a gallon, how much did he pay for all the gasoline?

4. How many gallons of gasoline will Mr. Holt need for a 500-mile automobile trip if he averages $12\frac{1}{2}$ miles per gallon?

Subtraction Practice

Subtract, and write the differences on a folded paper.

	1.	2.	3.	4.	5.	6.
(A)	63	195	9027	649	7692	2847
	31	2	7	41	50	506
(B)	2024	991	9690	3796	549	5907
	15	468	682	2038	60	263
(C)	915	7648	1441	5645	4271	8518
	76	479	59	3069	590	5940

Problems

1. The fifth grade of the Wilson School had a benefit movie. They sold 475 tickets at 35¢ each and 138 tickets at 15¢ each. They paid the owner of the theater $25 for the use of his building and machines, and all their other expenses amounted to $13.90. How much did the fifth grade clear on their movie?

2. Helen went to the grocery store one morning to buy some things for her mother. These are the things she bought: 2 cans of corn at 18¢ each, 3 loaves of bread at 12¢ each, 1 pound of bacon at 48¢, and a quarter's

worth of soap. Helen gave the merchant a $10 bill in payment. How much change should she have received?

3. Alcock and Brown were the first to cross the Atlantic in a biplane. They flew from St. Johns, Newfoundland to Clifden, Ireland, 1960 miles, in $16\frac{1}{5}$ hours. What was the average speed per hour?

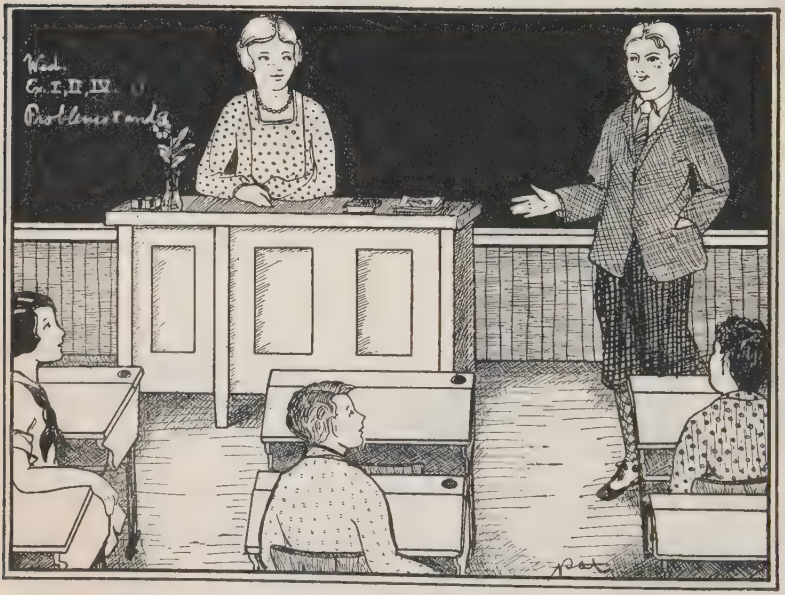
4. The airship Los Angeles crossed the Atlantic from Friedrichshafen, Germany, to Lakehurst, New Jersey, 5066 miles, in $81\frac{1}{4}$ hours. What was the average speed per hour?

5. Mr. Berry had a telephone installed in his home. His bill for the first month was·

Installation	$5.00
Regular charge	1.65
Long distance calls	2.45

What was Mr. Berry's total bill for the month?

Fun with Numbers



Henry: Miss Wheeler, I learned an interesting trick with numbers last night, and I should like to show it to the class.

Miss Wheeler: All right, Henry; we should like to know about your trick.

Henry: George, you may choose a number, but do not tell me what it is. Multiply your number by 9. Add 12. Divide by 3. Subtract 3 times the first number. Now, Mary, you tell George to add, subtract, multiply, or divide by some number—any number you wish.

Mary: George, you may multiply by 5.

Henry: Now, I'll tell George what he has. He has 20. Is that right, George?

George : Yes, that is right. I started with 7, like this:

The number I chose was:	7
Multiply by 9:	63
Add 12:	75
Divide by 3:	25
Subtract 3×7:	4
Multiply by 5:	20

I don't see how you knew that I had 20. You didn't know the number I chose, and you didn't know what Mary would tell me to do.

Henry: Here is the secret. I knew you had 4 just after you subtracted 3 times the first number. It makes no difference what number you start with. It always comes out 4 at this point if you make these moves and make no errors. Then, if I knew you had 4, all I had to do was what Mary told you to do. She told you to multiply by 5; so I multiplied by 5, too.

Chapter Review

Here is a review of what you have studied in this chapter. Write the numbers 1 to 8 on a sheet of paper. After each number, write the answer to the question that has the same number.

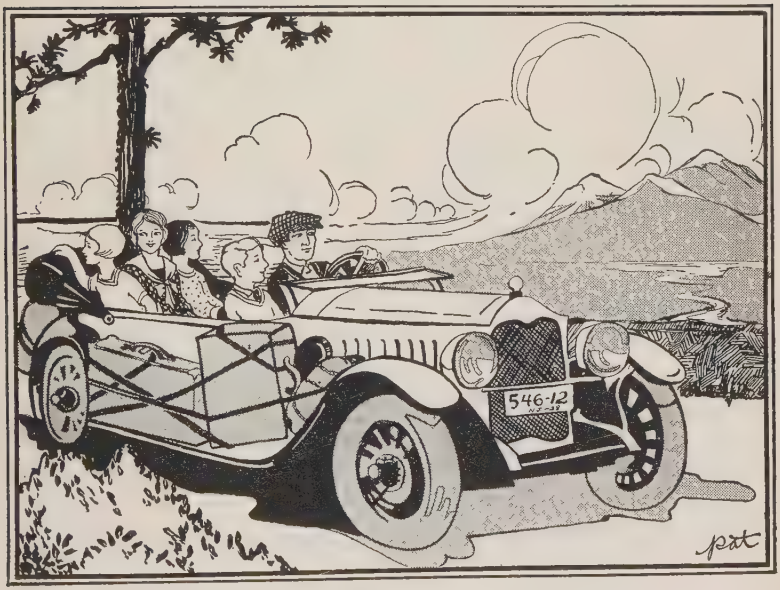
At the end of each question you will see a page number. If you missed any part of the test, turn back to the page number given after that part of the test, where you will find how to answer what you missed. Study what you missed until you are sure you know what to do. Then go back to the review and again try the part you missed. Do this until you do not miss anything or until your teacher tells you to work on something else.

1. How do you multiply a mixed number by a whole number (two ways)? (Pages 146 and 147)
2. How do you multiply a whole number by a mixed number (two ways)? (Page 147)
3. How do you multiply a mixed number by a fraction? (Page 150)
4. How do you multiply a fraction by a mixed number? (Page 150)
5. How do you multiply a mixed number by a mixed number? (Page 151)
6. How do you divide a mixed number by a whole number? (Page 152)
7. How do you divide a mixed number by a fraction? (Page 155)
8. How do you divide a mixed number by a mixed number? (Page 158)

CHAPTER IX

Adding and Subtracting Decimals

Adding Tenths and Hundredths



Mr. Bradley took his family on a long automobile trip. The first day they drove 237.4 miles, and the second day they drove 246.2 miles. How many miles did they drive all together in the two days?

To work this problem, you have to add 237.4 miles and 246.2 miles. In adding decimals, be sure to write the numbers so that the decimal points are in a straight line up and down. Then add as in adding whole

237.4 mi.
246.2 mi.
483.6 mi.

numbers and put a decimal point in the answer directly under the decimal points in the addends. Remember to keep all the decimal points in a straight line up and down. Writing the numbers in a column, with the decimal points in a straight line, and adding, we get 483.6 miles, which is the total distance Mr. Bradley and his family traveled in the two days.

James sells papers after school and on Saturdays. On Monday he took in \$1.35; on Tuesday, \$.85; on Wednesday, \$1.10; on Thursday, \$.90; on Friday, \$1.05; and on Saturday, \$2.15. How much money did James take in all together during the week?

To work this problem, you have to add. You have learned how to add sums of money. Just write the numbers in a column, with the decimal points in a straight line, and add as in adding whole numbers. Be sure to put a decimal point in the sum directly under the points in the addends and put a dollar sign on the left side of your answer. Adding, pointing off, and putting in the dollar sign, you get \$7.40 as the sum.

$$\begin{array}{r} \$1.35 \\ .85 \\ 1.10 \\ .90 \\ 1.05 \\ \underline{2.15} \\ \$7.40 \end{array}$$

Add .7, 4.32, 5.2, and 6.

First write the numbers in a column so that the decimal points will be in a straight line. You know that, to add fractions, the fractions should have the same denominator. These decimal fractions do not have the same denominator. Seven tenths, or $\frac{7}{10}$, or .7, has 10 as a denominator; and thirty-two hundredths, or $\frac{32}{100}$, or

$$\begin{array}{rrr} .7 & = & .70 \\ 4.32 & = & 4.32 \\ 5.2 & = & 5.20 \\ 6 & = & \underline{6.00} \\ & & 16.22 \end{array}$$

.32, has 100 as a denominator. But .7 can be changed to .70 without changing its value. In the same way, 5.2 can be changed to 5.20, and the whole number 6 can be changed to 6.00. Now the whole numbers and hundredths can be added just the same as in adding dollars and cents. Before adding decimals, be sure that they all have the same number of decimal places. If necessary, annex one or more 0's to make the number of decimal places the same. Then add as in adding whole numbers and put a decimal point in the sum directly under the decimal points in the addends. Adding the .7, 4.32, 5.2, and 6 and pointing off, you get 16.22 as the sum.

To add decimals, first write the numbers so that the decimal points are in a straight line up and down. Then add, and put a decimal point in the sum directly under the decimal points in the addends.

Practice in Adding Decimals

Copy, and add these decimals:

1. 5.3, 6.4, 3.7, and .2
2. .84, .37, .29, and .56
3. 2.3, .89, .08, and 7.42
4. 4.1, .7, .03, and .64
5. .27, .61, .1, and .18
6. .7, .9, .6, .3, and .4

7. .42, .37, .19, and 56
8. 2, .2, .02, and 20
9. 3.7, 42, .67, .8, and .47
10. 5, .37, 2.3, and 34

General Practice 13

Work these examples and problems. Time, 12 minutes.

1.	2.	3.	4.
Multiply:	Add:	Divide:	Subtract:
$17\frac{2}{3} \times \frac{5}{8}$	15.3, 4.1, 8, .75	$\frac{7}{8} \div \frac{1}{3}$	40,201 7,894

5.	6.	7.	8.
Add:	Add:	Multiply:	Subtract:
10.6, 127, 1.3, .54	$111\frac{3}{4}$ $\frac{7}{8}$ $5\frac{1}{3}$ $6\frac{1}{5}$	$15\frac{3}{4} \times 2\frac{1}{3}$	$9\frac{2}{5}$ $8\frac{3}{4}$

9. Add: 75, 2.8, .63, .4, and 85.36.
10. Charles found that he steps an average of $2\frac{1}{2}$ feet. How many steps does he take in walking a mile?
11. Mr. Thompson built a concrete sidewalk in front of his house. It was 3 feet wide and 48 feet long. It cost 25¢ a square foot. What was the cost of the sidewalk?
12. John's father bought a small farm that was 80 rods square, at $85 an acre. What did the farm cost?

Adding Tenths, Hundredths, and Thousandths

Add .516, .36, .2, and 4.26.

.516	=	.516
.36	=	.360
.2	=	.200
4.26	=	4.260
		5.336

As you remember, fractions cannot be added unless they have the same denominator. $.516 = \frac{516}{1000}$. It has 1000 as a denominator. $.36 = \frac{36}{100}$. It has 100 as a denominator. $.2 = \frac{2}{10}$. It has 10 as a denominator. $4.26 = 4\frac{26}{100}$. The denominator is 100. These denominators are not alike. But the fractions can be changed so that the denominators will be alike. The largest denominator is 1000; so we will change all of them to thousandths. .516 is already thousandths and does not need changing. .36 = .360; that is, 36 hundredths = 360 thousandths. .2 = .200; that is, 2 tenths = 200 thousandths. 4.26 = 4.260; that is, 4 and 26 hundredths = 4 and 260 thousandths. Now the decimals can be added, since all of them are thousandths. Adding, you get 5.336 as the sum.

To add decimals, first write the numbers so that the decimal points are in a straight line up and down.

Second, change all the fractions to the same denominator. Decimal fractions have the same denominator when they have the same number of places.

Third, add, and write the decimal point in the sum under the decimal points in the addends.

Practice in Adding Decimals

Copy, and add these decimals:

1. 1.01, 2.15, .095
2. 15.1, 10.25, 3.08, .005
3. 18.24, 16.915, 2.7, 18.45
4. .005, .105, 1.55
5. .01, 10.1, 2.001

Add, and write the sums on a folded paper.

	6.	7.	8.	9.	10.
(A)	4.2	5.42	2.4	7.1	3.457
	14.3	3.86	3.62	.54	.63
	2.1	2.06	5.3	1.2	25.
(B)	17.45	20.001	75.52	20.	41.95
	1.209	1.1	8.409	50.	16.7
	5.6	3.09	6.7	.85	8.004
	.042	1.189	12.	1.005	15.17

Multiplication Practice

Multiply, and write the products on a folded paper.

	1.	2.	3.	4.	5.
(A)	34	32	832	83	974
	21	24	12	33	74
(B)	294	796	975	307	3004
	86	48	560	79	56
(C)	580	634	374	687	4241
	340	705	462	382	392

Problems

1. Jack's father is a surveyor. To measure distances, he uses a long steel tape that shows feet and hundredths of feet. In measuring across the school grounds these were the different distances: 78.42 ft.,

85.36 ft., 67.08 ft., 92.29 ft., 99.07 ft., 84.57 ft., and 93.21 ft. How many feet long was it across the school grounds?

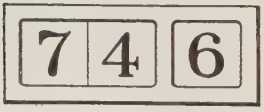
2. On the Big Four Railroad it is 109.7 miles from Cincinnati to Indianapolis, 128.2 miles from Indianapolis to Mattoon, Ill., and 123.9 miles from Mattoon to St. Louis. By this route how many miles is it from Cincinnati to St. Louis? How many miles is it from Indianapolis to St. Louis?

3. James kept a record of the number of miles made each day on an automobile trip. The first day they traveled 214.2 miles; the second day, 189.5 miles; the third day, 287.1 miles; the fourth day, 302.7 miles; the fifth day, 297.4 miles. What was the total number of miles covered in the five days?

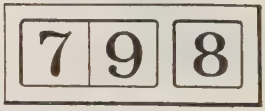
4. It is 10.7 miles from my farm to the county seat. It is 73.8 miles from the county seat to the State Capitol. How far is it from my farm to the State Capitol by way of the county seat?

5. On the Santa Fe Railroad it is 451.1 miles from Chicago, Ill., to Kansas City, Mo.; from Kansas City, Mo., to Emporia, Kans., it is 112.1 miles; from Emporia, Kans., to La Junta, Colo., it is 428 miles; from La Junta, Colo., to Albuquerque, N. Mex., it is 347.5 miles; and from Albuquerque, N. Mex., to Los Angeles, Calif., it is 889.3 miles. How many miles is it from Chicago, Ill., to Los Angeles, Calif., on this railroad?

Subtracting Tenths



74.6



79.8

Mr. Mathews lives on a farm, but runs a store in town. One morning when he started to town, the speedometer registered 74.6, which meant, of course, 74.6 miles. When Mr. Mathews reached town, the speedometer showed 79.8 miles. Mr. Mathews now knows what the exact distance is from his farm to town. What is it?

79.8 mi.
74.6 mi.
5.2 mi.

To work this problem, we must subtract. Just as in addition of decimals, we write the numbers in a column, with the decimal points in a straight line. Then we subtract, just as in subtracting whole numbers, and put a decimal point in the difference directly under the points in the numbers in the example. Subtracting 74.6 from 79.8 gives 5.2. Then, it is 5.2 miles from Mr. Mathews' farm to town.

Distances on a Railroad

Following is a section of a railroad table which shows the distance from several towns in Illinois, Iowa, and Missouri to Chicago.

Miles from Chicago	Cities
0	Chicago, Illinois
36.8	Elgin, Illinois
138.2	Savanna, Illinois
186.4	Davenport, Iowa
213.8	Muscatine, Iowa
249.3	Washington, Iowa
295.3	Ottumwa, Iowa
417.3	Chillicothe, Missouri
470.7	Excelsior Springs, Missouri
503.8	Kansas City, Missouri

1. How many miles is it from Chicago to Davenport, Iowa?

2. How many miles is it from Chicago to Kansas City, Mo.?

3. How many miles is it from Elgin, Ill., to Savanna, Ill.?

4. How many miles is it from Washington, Iowa, to Chillicothe, Mo.?

5. How many miles is it from Excelsior Springs, Mo., to Kansas City, Mo.?

6. How many miles is it from Muscatine, Iowa, to Ottumwa, Iowa?

7. How many miles is it from Excelsior Springs, Mo., to Savanna, Ill.?

8. How many miles is it from Kansas City, Mo., to Elgin, Ill.?

9. Which is farther, from Muscatine, Iowa, to Savanna, Ill., or from Muscatine to Chillicothe, Mo.?

10. Which is farther, from Elgin, Ill., to Davenport, Iowa, or from Kansas City, Mo., to Ottumwa, Iowa?

Subtracting Hundredths and Thousandths

Study the examples below and answer the following questions:

Example 1	Example 2	Example 3
15.245	5.8 = 5.80	10.4 = 10.400
10.482	.27 = .27	5.895 = 5.895
4.763	5.53	4.505

Are the decimal points in a straight line?

Is the decimal point in the difference under the decimal points in the minuend and subtrahend in each example?

Is 5.8 = 5.80?

Is 5.8 − .27 = 5.80 − .27?

Is 10.400 the same as 10.4? Is 10.4 − 5.895 = 10.400 − 5.895?

Are the numbers subtracted as if they were whole numbers?

Are thousandths written under thousandths in example 1? In example 3? In example 2?

To subtract decimals, first write the numbers so that the decimal points are in a straight line up and down.

Second, change the fractions so that they all have the same number of decimal places.

Third, subtract as if the numbers were whole numbers.

Fourth, write the decimal point in the difference under the decimal points in the minuend and subtrahend.

Practice in Subtracting Decimals

Copy, and subtract these decimals:

1. 4.981 − 3.789
2. 10.9 − 4.25
3. 1015 − 976.582
4. .093 − .006
5. 1 − .75

Subtract, and write the differences on a folded paper.

	6.	7.	8.	9.	10.
(A)	16.75	25.7	45.79	4.005	14.79
	12.842	16.9	18.534	3.2	11.6
(B)	829.5	54.6	.991	1.1	1723.64
	6.25	29.865	.009	.84	926.856

General Practice 14

Work these examples and problems. Time, 12 minutes.

1.	2.	3.	4.
Subtract: 50,001 8,097	Reduce to lowest terms: $\frac{70}{84}$	Add: $93\frac{3}{4}$ $5\frac{2}{3}$ $1\frac{7}{8}$	Divide: $25\frac{7}{8} \div \frac{1}{8}$

5.	6.	7.	8.
Multiply: $5\frac{3}{4} \times 8\frac{1}{3}$	Subtract: $64\frac{7}{12}$ $5\frac{1}{5}$	Find: $\frac{4}{7}$ of $13\frac{1}{3}$	Add: 4125 683 9087 293 642 7395 856

9. Add 57, .2, .864, and 3.87.

10. The total rainfall for one year was 44.3 inches in Louisville, Kentucky, and 47.1 inches in Galveston, Texas. Which city had more rainfall? How much more?

11. Large sheets of paper are $17'' \times 22''$. Can sheets $8\frac{1}{2}'' \times 11''$ be cut from these larger sheets without wasting any of the paper? If so, how many sheets $8\frac{1}{2}'' \times 11''$ can you get out of a dozen sheets $17'' \times 22''$?

12. A miller put 12,250 pounds of flour into sacks holding 49 pounds each. How many sacks did he use?

Problems

1. The fifth grade of the Emerson School had a spelling match, and Mary and George were asked to choose sides. To see who was to get the first choice, they guessed at the number of a page in a book which the teacher had marked. Mary guessed 173, and George guessed 119. The correct number was 147. Whose guess was closer? How much closer?

2. Helen's father allows her 45¢ a week for spending money. How much does that amount to in 52 weeks?

3. Mr. Brown bought a radio for $125. He paid $45 in cash and agreed to pay the balance at the rate of $5 each month. How many months will it take to pay for the radio in full?

4. In a school which has seven teachers, one of them receives $175 a month; two receive $162.50; three receive $150; and one receives $137.50. How much do these seven teachers get all together in 1 month? How much do they get in a school year of 8 months? 9 months? 10 months?

Long Division Practice

Copy, and divide by long division.

	1.	2.	3.	4.
(A)	$21\overline{)63}$	$34\overline{)69}$	$26\overline{)78}$	$45\overline{)94}$
(B)	$49\overline{)196}$	$37\overline{)297}$	$25\overline{)100}$	$19\overline{)57}$
(C)	$92\overline{)276}$	$63\overline{)138}$	$49\overline{)245}$	$18\overline{)92}$

Average Height and Weight of Baby Boys

Below you will find the average height and weight of boys, by months, during their first year. Copy the tables and write in the proper place the gain in height and weight each month.

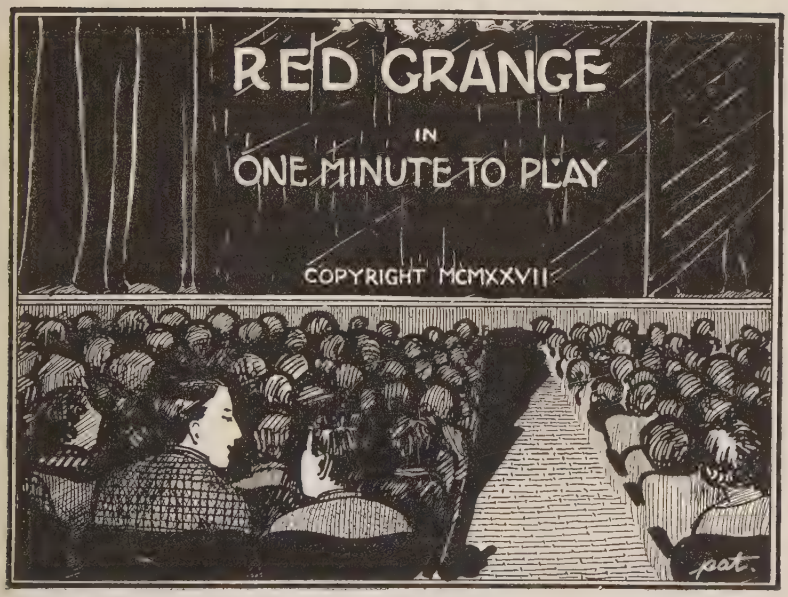
Age	Height (In.)	Gain in Height	Age	Weight (Lb.)	Gain in Weight
Birth	$20\frac{3}{5}$		Birth	$7\frac{3}{5}$	
3 months	$23\frac{1}{2}$		3 months	13	
6 months	$26\frac{1}{2}$		6 months	18	
7 months	$27\frac{1}{4}$		7 months	$19\frac{1}{8}$	
8 months	$27\frac{5}{8}$		8 months	$19\frac{3}{4}$	
9 months	$28\frac{1}{8}$		9 months	$20\frac{3}{8}$	
10 months	$28\frac{1}{2}$		10 months	$20\frac{7}{8}$	
11 months	29		11 months	$21\frac{3}{8}$	
12 months	$29\frac{3}{8}$		12 months	$21\frac{7}{8}$	

Multiplication Practice

Multiply, and write the products on a folded paper.

	1.	2.	3.	4.	5.	6.
(A)	34	73	213	813	182	597
	2	6	2	5	7	8
(B)	28	43	65	82	69	507
	21	22	70	45	47	28
(C)	528	122	735	634	596	4217
	36	413	429	207	800	49

Roman Numerals



Charles: Father, what is that big Roman number on the screen?

Father: It is MCMXXVII, and it means 1927, the year this picture was made. You remember how to write 27 as a Roman number, don't you?

Charles: Yes, I remember that 27 is XXVII.

Father: Well, when we get home, I'll explain to you how to write 1927 as a Roman number. We want to watch the picture now.

That evening, when Charles and his father got home, Charles's father explained how to write large Roman numbers, as follows:

You have already learned that I = 1, V = 5, and X = 10, and you have learned how to make Roman

numbers up to XXXIX. To write larger Roman numbers, you need to learn the value of some other letters. They are:

L = 50 C = 100 D = 500 M = 1000

You have now learned the values of the seven letters that are used in writing Roman numbers.

I = 1 V = 5 X = 10 L = 50
C = 100 D = 500 M = 1000

There are six Roman numbers that are formed by subtracting the value of the first letter from the value of the second letter. They are:

IV = 4 IX = 9 XL = 40 XC = 90
CD = 400 CM = 900

These are the only ones that are formed in this way.

Sometimes the letters I, X, C, and M are repeated. Repeating a letter repeats its value. There are only eight numbers that can be formed in this way. They are:

II = 2	XX = 20	CC = 200	MM = 2000
III = 3	XXX = 30	CCC = 300	MMM = 3000

The letters I, X, C, and M are never repeated more than three times.

There are twenty-one Roman numbers that are formed by adding the value of the second letter to the value of the first letter. They are:

VI = 6	XI = 11	XV = 15
LI = 51	LV = 55	LX = 60
CI = 101	CV = 105	CX = 110

CL = 150	DI = 501	DV = 505
DX = 510	DL = 550	DC = 600
MI = 1001	MV = 1005	MX = 1010
ML = 1050	MC = 1100	MD = 1500

All other Roman numbers are formed by combining two or more numerals in such a way that the largest numeral is always on the left.

LVIII = 58 (L + VIII)
CLIV = 154 (CL + IV)
CXLVI = 146 (C + XL + VI)
DXCVII = 597(D + XC + VII)
MCMXXVIII = 1928 (M + CM + XX + VIII)
XLII = 42 (XL + II)
XCVIII = 98 (XC + VIII)
DLV = 555 (D + LV)

Now do you see that in the number MCMXXVII the first M = 1000, the CM = 900, and the XXVII = 27? Then, MCMXXVII = 1927.

Problems

1. The Declaration of Independence was signed in 1776. Write this date as a Roman number.

2. An office building in a large city was built in 1924. On the corner stone of the building, the year is carved as a Roman number. What letters are on the corner stone?

3. In what year were you born? Write it as a Roman number.

4. The number on a movie film showed that it was made in 1926. Write this date as a Roman number.

5. Columbus discovered America in 1492. Write this date as a Roman number.

6. The inscription on a monument reads, "Erected in MCMVI." In what year was it erected?

7. Over the door of a new high school is MCMXXVIII. In what year was the high school built?

8. On the corner stone of an old church is MDCLXXXIV. In what year was the church built?

Practice in Reading Roman Numbers

Read these Roman numbers:

	1.	2.	3.	4.
(A)	XLI	MIV	CD	CI
(B)	MMXC	LIX	MMC	CDXC
(C)	CCII	MMCM	LXIV	MMDL
(D)	MMMI	CCCXXX	MMM	LXXIX

Practice in Writing Roman Numbers

Write as Roman numbers:

	1.	2.	3.	4.
(A)	75	1930	2003	673
(B)	725	104	1935	3164
(C)	1005	864	216	1940
(D)	1896	1914	978	538

General Practice 15

Work these examples and problems. Time, 12 minutes.

1.	2.	3.	4.
Subtract:	Multiply:	Add:	Divide:
$108.3 - 2.467$	$42\frac{1}{3} \times \frac{3}{4}$	5 ft. 47 ft. 615 ft. 38 ft.	$5\overline{)\$3075}$

5.	6.	7.	8.
Change to Arabic numbers and add: C LIX M XX VII	Subtract: $50.1 - 2.37$	Change to Arabic numbers and subtract: MCMXXV − MCMXX	Subtract: $28\frac{4}{7}$ $16\frac{2}{3}$

9. Helen and Cleo were looking at a movie. Helen noticed that the picture was made in the year MCMXXV. What year was this?

10. Mr. Fish, a grocer, put up 100 pounds of sugar in 5-pound packages. If he sold each package for 35¢, how much did he receive for all the sugar?

11. Mr. Berry paid $22.20 last year for telephone service. What was his average monthly bill?

12. If it takes 14 pounds of red clover seed to sow an acre, how many bushels of red clover seed will be required to sow $18\frac{1}{2}$ acres? Red clover seed weighs 60 pounds to the bushel.

Chapter Review

Here is a review of what you have studied in this chapter. Write the numbers 1 to 8 on a sheet of paper. After each number you have written, write the answer to the question that has the same number.

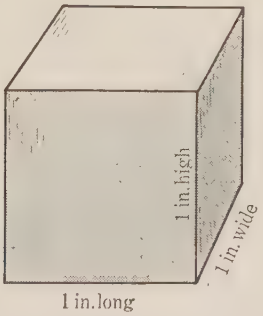
At the end of each question you will see a page number. If you missed any part of the test, turn back to the page number given after that part of the test, where you will find how to answer what you missed. Study what you missed until you are sure you know what to do. Then go back to the chapter review and again try the part you missed. Do this until you do not miss anything or until your teacher tells you to work on something else.

1. Add 237.4 and 246.2. (Page 165)
2. Add .7, 4.32, 5.2, and 6. (Page 169)
3. How do you add decimals? (Page 169)
4. Subtract 74.6 from 79.8. (Page 172)
5. Subtract 5.895 from 10.4. (Page 174)
6. How do you subtract decimals? (Page 175)
7. Write MCMXXXIX as an Arabic number. (Page 181)
8. Write 1940 as a Roman number. (Page 181)

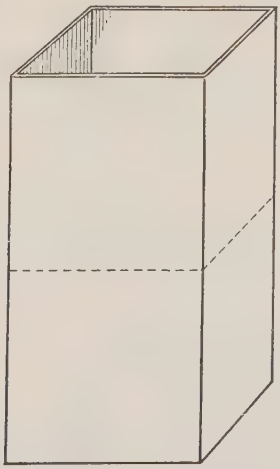
CHAPTER X

Finding Volumes

Finding the Number of Cubic Inches

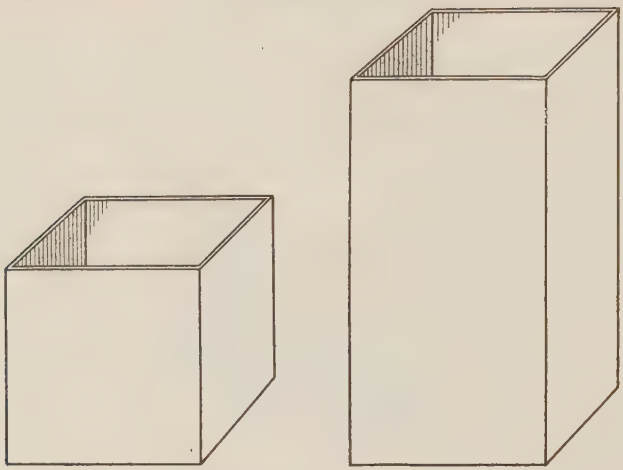


Here is a picture of a box that is 1 inch high, 1 inch long, and 1 inch wide. It holds 1 **cubic inch** (1 cu. in.).



Here is a picture of a box that is 2 inches high, 1 inch long, and 1 inch wide. Do you see that it will hold 2 cubic inches?

Compare these two boxes:



Are they the same length?
Are they the same width?
Are they the same height?

If the length and width of the second box are just the same as the length and width of the first box and if the second box is twice as high as the first box, will the second box hold twice as much as the first box? If it were three times as high and the other dimensions were just the same, would it hold three times as much? What is 2×1 cu. in.? What is 3×1 cu. in.?

Think the answers for these:

1. A box that is 1 in. long, 1 in. wide, and 1 in. high holds __?__ cubic inch.
2. A box that is 1 in. long, 1 in. wide, and 2 in. high holds __?__ cubic inches.
3. A box that is 1 in. long, 1 in. wide, and 3 in. high holds __?__ cubic inches.

4. A box that is 1 in. long, 1 in. wide, and 6 in. high holds __?__ cubic inches.

5. A box that is 1 in. long, 1 in. wide, and 4 in. high holds __?__ cubic inches.

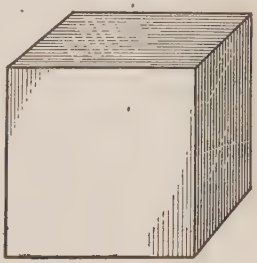
6. A box that is 1 in. long, 1 in. wide, and 8 in. high holds __?__ cubic inches.

7. A box that is 1 in. long, 1 in. wide, and 5 in. high holds __?__ cubic inches.

8. A box that is 1 in. long, 1 in. wide, and 7 in. high holds __?__ cubic inches.

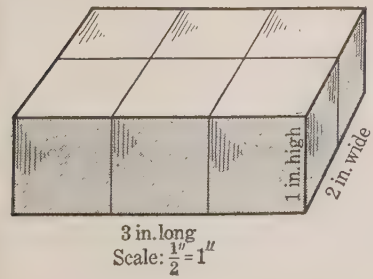
9. A box that is 1 in. long, 1 in. wide, and 9 in. high holds __?__ cubic inches.

Did you ever see a piece of wood shaped like the one on the right? How long is it? How wide is it? How high is it? How many sides, or **faces**, has it? Any solid figure that has six equal square faces is called a **cube**. This, then, is a picture of an inch cube of wood.



If you had a box 1 in. wide, 1 in. high, and 9 in. long, how many inch cubes could you put into it?

Now suppose that you had a box in the form of a rectangular solid that is 3 in. long, 2 in. wide, and 1 in. high. (A **rectangular solid** is a solid with six faces that are rectangles.) How many inch cubes could you put into it?



Do you see that you could put 3 inch cubes in 1 row, and that there

would be 2 rows? 2×3 cu. in. $= ?$ Do you see that you could put 6 cubes, 1 inch each way, into the box?

> To find the number of cubic inches in a rectangular solid that is 1 inch high, multiply the number of inch cubes in 1 row by the number of rows.

Practice in Finding the Number of Cubic Inches

Think the answers for these:

1. A box 2 in. long, 2 in. wide, and 1 in. high contains __?__ cu. in.
2. A box 3 in. long, 3 in. wide, and 1 in. high contains __?__ cu. in.
3. A box 4 in. long, 2 in. wide, and 1 in. high contains __?__ cu. in.
4. A box 4 in. long, 3 in. wide, and 1 in. high contains __?__ cu. in.
5. A box 5 in. long, 3 in. wide, and 1 in. high contains __?__ cu. in.
6. A box 4 in. long, 4 in. wide, and 1 in. high contains __?__ cu. in.
7. A box 5 in. long, 2 in. wide, and 1 in. high contains __?__ cu. in.
8. A box 5 in. long, 5 in. wide, and 1 in. high contains __?__ cu. in.
9. A box 6 in. long, 2 in. wide, and 1 in. high contains __?__ cu. in.
10. A box 6 in. long, 3 in. wide, and 1 in. high contains __?__ cu. in.

Addition Practice

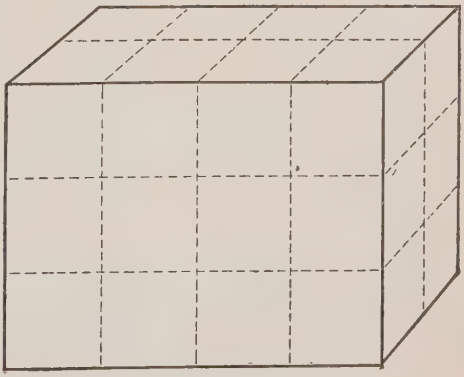
Add, and write the sums on a sheet of paper.

1.	2.	3.	4.	5.
12	201	302	4002	4002
40	225	205	46	431
88	653	168	3839	6797
13	245	300	2350	2121
58	986	893	6598	6367
25	232	548	2101	5
97	486	776	9733	8948
21	17	160	3515	3584
53	838	424	8678	5771

Volumes of Rectangular Solids — Cubic Inches, Cubic Feet, and Cubic Yards

Suppose that you had a rectangular box 4 in. long, 3 in. high, and 2 in. wide. How many inch cubes could you put into it?

How many cubes could you put in 1 row on the bottom? How many rows are there on the bottom? If there are 4 cubes in 1 row, how many cubes are there in 2 rows? 2×4 cu. in. = ? How many layers,

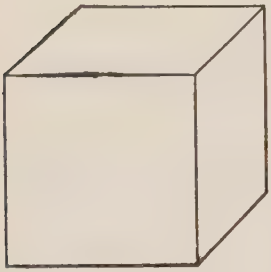


Scale: $\frac{1}{2}$ in. = 1 in.

containing 8 cubes each, could you put into this box? If there are 8 cubes in 1 layer, how many cubes are there in 3 layers? 3×8 cu. in. = ? Then how many cubes could you put into the whole box?

We could ask this question about the box in another way by saying: What is the **volume** of the box in cubic inches?

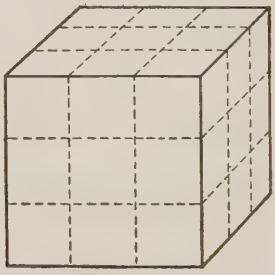
> To find the volume in cubic inches of a rectangular solid, multiply the number of cubic inches in 1 layer by the number of layers.



Scale: 1 in. = 1 ft.

Similar to 1 cubic inch (1 cu. in.), we have 1 **cubic foot** (1 cu. ft.) and 1 **cubic yard** (1 cu. yd.). Any rectangular solid that is 1 ft. long, 1 ft. wide, and 1 ft. high contains 1 cubic foot. Or a rectangular solid that is 2 ft. long, 1 ft. wide, and $\frac{1}{2}$ ft. high contains 1 cubic foot. That is, its volume is 1 cubic foot. Name some other dimensions of solids having a volume of 1 cubic foot.

In the same way, any rectangular solid that is 1 yd. long, 1 yd. wide, and 1 yd. high contains 1 cubic yard. Name some other dimensions of solids that contain 1 cubic yard.



Scale: 1 in. = 1 yd.

A cube that is 3 ft. long, 3 ft. wide, and 3 ft. high also contains 27 cubic feet, or 1 cubic yard.

3 ft. = 1 yd.
27 cu. ft. = 1 cu. yd.

To find the volume in cubic feet of a rectangular solid, multiply the number of cubic feet in 1 layer by the number of layers.

To find the volume in cubic yards of a rectangular solid, multiply the number of cubic yards in 1 layer by the number of layers.

Problems

1. How many cubic feet of water are there in a tank 20 feet long, 12 feet wide, and 6 feet deep?

2. The inside measurements of the drawer in John's desk are 12 inches long, 8 inches wide, and 4 inches deep. How many cubic inches does the drawer contain?

3. The inside of Mary's cedar chest measures 4 feet long, $1\frac{3}{4}$ feet wide, and $1\frac{1}{2}$ feet high. How many cubic feet does the chest contain?

4. A room is 5 yards long, 4 yards wide, and 3 yards high. What is its volume in cubic yards?

5. The inside of a box is 4 inches wide, 4 inches high, and 9 inches long. How many cubic-inch blocks will it hold?

6. How many cubic inches are there in a suit case the inside of which is 24 inches long, 16 inches wide, and 8 inches deep?

7. How many cubic inches are there in a drawer the inside of which is 18 inches wide, 18 inches long, and 6 inches deep?

8. What is the volume in cubic feet of a piece of ice $1\frac{1}{2}$ feet long, 1 foot wide, and $\frac{3}{4}$ foot thick?

9. How many cubic inches of water will an aquarium hold that is 27 inches by 24 inches by 18 inches?

10. A gallon of water contains 231 cubic inches. How many gallons of water can be put into a rectangular tin vessel 16 inches by 12 inches by 8 inches?

General Practice 16

Work these examples and problems. Time, 12 minutes.

1.	2.	3.	4.
Add:	Write as a Roman number:	Subtract:	Subtract:
$4\frac{2}{3}$	1929	$17\frac{2}{5}$	$8.9 - 2.193$
$3\frac{5}{6}$		$8\frac{3}{4}$	
$2\frac{1}{5}$			

5.	6.	7.	8.
Divide:	Multiply:	Multiply:	Divide:
$29\overline{)58{,}116}$	$16\frac{2}{3} \times 18\frac{3}{4}$	579	$12\frac{1}{2} \div 2\frac{2}{3}$
		608	

9. Add: 5.7, 834, .29, .683.

10. If you average 30 miles an hour in an automobile, how far can you go from 7:10 A.M. to 5.40 P.M., allowing $\frac{1}{2}$ hour for lunch?

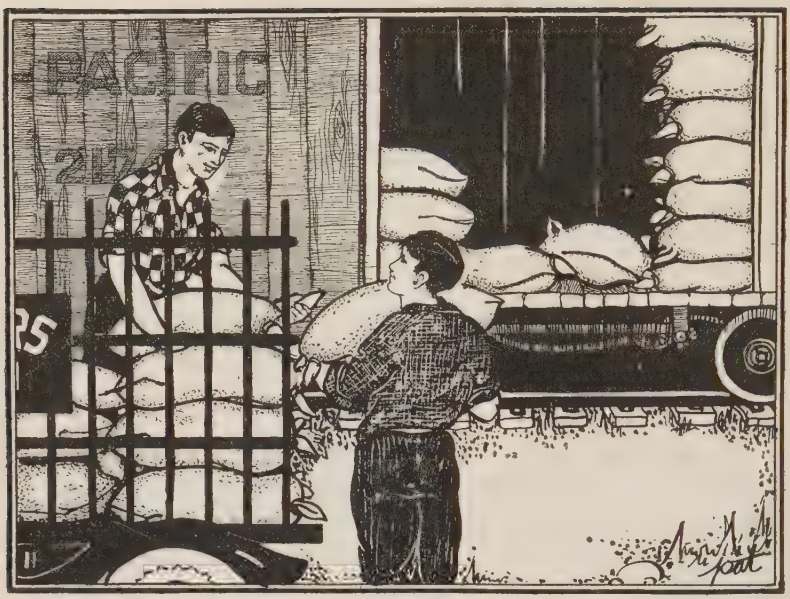
11. In scientific measurements, a meter is used as a unit of measure. A meter is 39.37 inches long. How much longer than a yard is a meter?

12. Madison is $446\frac{1}{4}$ miles from St. Louis. Mr. Young drove from St. Louis to Madison in 10 hours, 30 minutes. How many miles did he average per hour?

Problems

Many kinds of produce are bought and sold by the bushel, but the bushel must weigh a certain number of pounds, depending upon the thing bought or sold. Thus the weights for one bushel of some common things usually are:

	Per Bushel
Apples	48 lb.
Barley	48 lb.
Beans	60 lb.
Coal	80 lb.
Corn (shelled)	56 lb.
Corn (on ear)	70 lb.
Flaxseed	55 lb.
Lime	70 lb.
Oats	32 lb.
Onions	57 lb.
Peas	60 lb.
Potatoes	60 lb.
Rye	56 lb.
Wheat	60 lb.



1. A freight car will hold 65,400 pounds of wheat. How many bushels of wheat will it hold?

2. A grain dealer shipped to Chicago 3 carloads of shelled corn weighing 56,000 lb., 57,120 lb., and 67,760 lb. How many bushels of corn did he ship in all?

3. Jack's father is a farmer. Last year he raised 7520 bushels of corn, which he sold on the ear at 76¢ a bushel. How much did he get for his corn?

4. Last year Tom's father raised 86,400 pounds of wheat on 45 acres. What was the average yield in bushels per acre?

What are the missing numbers?

5. 4 bu. of peas = __?__ pounds
6. 140 lb. of lime = __?__ bushels
7. 3 bu. of apples = __?__ pounds

8. 240 lb. of potatoes = __?__ bushels
9. 5 bu. of barley = __?__ pounds
10. 9 bu. of coal = __?__ pounds
11. 480 lb. of oats = __?__ bushels
12. 7 bu. of beans = __?__ pounds
13. 114 lb. of onions = __?__ bushels
14. 630 lb. of rye = __?__ bushels
15. 448 lb. of flaxseed = __?__ bushels

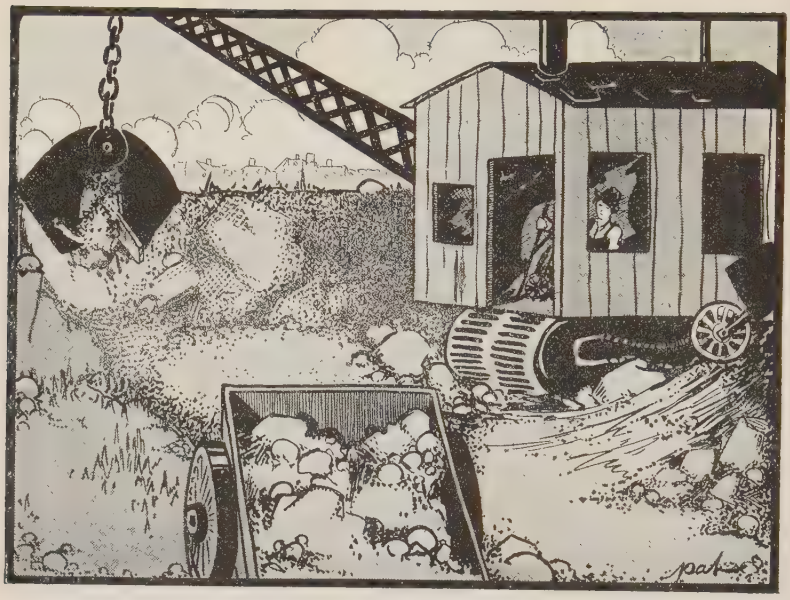
Long Division Practice

Copy these examples and divide by long division.

	1.	2.	3.
(A)	$14\overline{)70}$	$29\overline{)88}$	$13\overline{)127}$
(B)	$41\overline{)7380}$	$82\overline{)24{,}928}$	$17\overline{)3406}$
(C)	$24\overline{)4800}$	$31\overline{)1650}$	$86\overline{)3498}$
(D)	$32\overline{)82}$	$29\overline{)189}$	$42\overline{)208}$
(E)	$43\overline{)24{,}080}$	$17\overline{)15{,}300}$	$35\overline{)7245}$
(F)	$815\overline{)226{,}570}$	$352\overline{)256{,}608}$	$814\overline{)407{,}000}$

Problems

1. How many cubic yards of dirt are removed in digging a basement 10 yd. long, 9 yd. wide, and 3 yd. deep?



2. The excavation for an office building is 30 yd. by 25 yd. by 6 yd. The dirt is hauled away in wagons holding 2 cubic yards of dirt. How many trips are necessary? If 10 wagons are used, how many trips does each wagon make?

3. A big truck has a capacity of 3 cubic yards. How many cubic feet does it hold?

4. The inside of a freight car is $7\frac{1}{2}$ ft. high, 9 ft. wide, and 40 ft. long. How many cubic yards does it contain?

5. If the freight car mentioned in problem 4 is $\frac{3}{4}$ full of wheat, how many cubic feet of wheat are there in the car?

6. If one bushel of wheat occupies $1\frac{1}{4}$ cubic feet of space, how many bushels of wheat are there in a car like the one described in problem 4 if it is $\frac{1}{3}$ full?

Fun with Numbers

Charles: Miss Jones, my Uncle George showed me an interesting trick with some grains of corn last night.

Miss Jones: All right, Charles, show it to us.

Charles: It takes two to do this trick. First, I'll choose Mary and John. Mary, you count out any number of grains you please. Tell John how many grains you counted out, but do not tell me.

Mary: All right. I have counted out some.

Charles: John, you count 2 times as many, or 3 times as many, or 4 times as many, and so on, as you please.

John: All right. I'll count out 5 times as many as Mary did.

Charles: Mary, you give some of your grains to John. Choose the number you will give.

Mary: I'll give John 3 grains.

Charles: John, you give back to Mary 5 times as many as she had left. Now, John, I know how many grains you have. You have 18 grains.

John: Well, how in the world did you know that?

Charles: It is really easy to find out. I multiplied 6 by 3. The 6 is 1 more than the 5 that you chose, and 3 is the number that Mary gave you. You remember you said, "I'll count out 5 times as many as Mary did." So all I had to do was multiply 6 by 3. This gave 18, the number you had left.

John: That is an interesting trick. Let's see if I can do it.

Charles: All right. This time you may find out

how many Mary has left. I'll start by counting out some number.

Mary: I'll count out 4 times as many.

Charles: I'll give Mary 2 of mine.

Mary: I'll give back to Charles 4 times as many as he had left. Now how many have I?

John: You have 10 left. Is that right?

Mary: Yes, that is right. And I believe I see how you found it. You multiplied 5 by 2. The 5 is 1 more than the 4 that I chose, and the 2 is the number Charles gave to me. Isn't that it, Charles?

Charles: Yes, that is right. However, there is one thing you have to watch. You remember John chose 5 times as many as Mary a while ago, and I told him to give back 5 times as many as Mary had left. Just now, Mary, you chose 4 times as many as I, and you gave back 4 times as many as I had left. These two numbers must always be alike. Then the trick comes out right.

Mary: I'll have fun with that trick at my party next week.

John: And I'll have a lot of fun with it at home to-night.

General Practice 17

Work these examples and problems. Time, 12 minutes.

1.	2.	3.	4.
Subtract:	Add:	Find:	Multiply:
$9.7 - 4.32$	$7\frac{1}{2}$	$\frac{5}{7}$ of $89\frac{1}{6}$	$21\frac{3}{4} \times 1\frac{2}{3}$
	$15\frac{2}{3}$		
	$6\frac{5}{6}$		

5.	6.	7.	8.
Add:	Divide:	Subtract:	Subtract:
5 ft. 7 in. 2 ft. 9 in.	$53\frac{1}{3} \div 2\frac{1}{7}$	$31\frac{1}{4}$ $7\frac{3}{5}$	9 ft. 2 in. 3 ft. 7 in.

9. Add five and seventy-two hundredths, nine tenths, four hundred and fifty-six thousandths, seventy-nine hundredths, and eighty-three.

10. Which is more, 50 miles or .51 miles? How much more?

11. The number on the corner stone of a school building is MDCCCXCIX. When was this school building built? How old is this building now?

12. If you can get 15 pounds of sugar for a dollar, how much is this per pound?

Chapter Review

Here is a review of what you have studied in this chapter. Write the numbers 1 to 8 on a sheet of paper. After each number, write the answer to the question that has the same number.

At the end of each question you will see a page number. If you missed any part of the test, turn back to the page number given after that part of the test, where you will find how to answer what you missed. Study what you missed until you are sure you know what to do. Then go back to the review and again try the part you missed. Do this until you do not miss anything or until your teacher tells you to work on something else.

1. What is a cubic inch? (Page 185)

2. How many cubic inches are there in a box that is 1 in. wide, 1 in. high, and 7 in. long? (Page 186)

3. What is a cube? (Page 187)

4. How many cubic inches are there in a box that is 3 in. long, 2 in. wide, and 1 in. high? (Page 187)

5. How do you find the number of cubic inches in a rectangular solid that is 1 inch high? (Page 188)

6. How many cubic inches are there in a rectangular solid that is 4 in. long, 3 in. wide, and 2 in. high? (Page 189)

7. How do you find the number of cubic inches in a rectangular solid? (Page 190)

8. How many cubic feet are there in a cubic yard? (Page 191)

PART THREE

CHAPTER XI

Review of What You Have Studied

You are now beginning the study of sixth-grade arithmetic. Your work in this grade depends somewhat upon how well you remember what you learned in the fifth grade. There follow some review exercises that contain many of the important facts in arithmetic that you should know by this time. See if you can answer all the questions and work all the problems without any errors. If necessary, get your teacher to help you, but help yourself as much as you can.

Practice Test in Addition

Add, and write the sums on a folded paper. Time, 7 minutes.

	1.	2.	3.	4.	5.	6.
(A)						1
		7				6
	8	9				4
	3	8	37	57	78	7
	9	5	42	28	23	9
(B)		30		39	47	
	347	14	432	7	93	538
	52	23	357	15	86	657

	1.	2.	3.	4.	5.	6.
(C)			52	26	97	
	30	19	10	7	85	
	5	37	1	15	63	214
	21	15	31	3	48	430
	42	18	4	48	37	342
(D)						18,473
					5237	65,928
	208	182	379	645	1459	14,756
	127	464	157	897	6834	29,387
	546	173	398	738	5929	42,895

Practice Test in Subtraction

Subtract, and write the differences on a folded paper. Time, 7 minutes.

	1.	2.	3.	4.	5.	6.
(A)	89	90	539	957	595	504
	51	65	216	10	386	25
(B)	879	354	628	109	555	875
	790	19	50	4	7	189
(C)	6466	1130	2192	7065	2090	1401
	203	846	6	20	19	70
(D)	6531	7982	8980	9738	4440	2977
	73	2	541	184	730	298

	1.	2.	3.	4.	5.	6.
(E)	8260	6224	7430	9589	3241	9856
	843	466	532	3579	2102	8584
(F)	4347	1508	8373	6322	8451	91,226
	3406	1479	2769	5079	3689	34,587

Practice Test in Multiplication

Multiply, and write the products on a folded paper. Time, 7 minutes.

	1.	2.	3.	4.	5.	6.
(A)	63	43	57	82	407	659
	12	22	30	76	19	37
(B)	413	357	893	738	9147	8327
	212	624	405	600	68	439
(C)	62,359	42,837	1484	52,147	59,378	82,493
	73	905	3265	1,007	4,698	91,657

Practice Test in Division

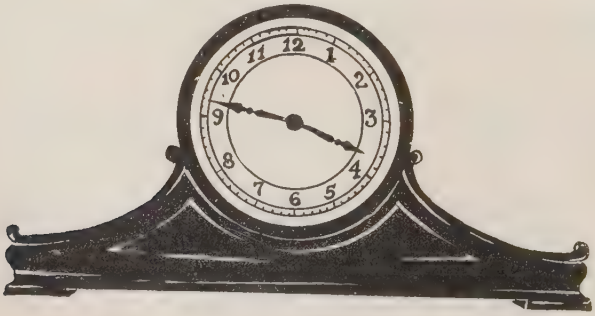
Copy, and divide by long division. Time, 7 minutes.

	1.	2.	3.
(A)	73)1752	29)464	57)1710
(B)	65)13,520	34)17,680	67)6566
(C)	812)190,820	436)89,380	738)309,960

General Review

Here are some questions about what you have studied in arithmetic. Write the numbers 1 to 24 on a sheet of paper and then write the answers after the numbers of the questions.

1. What are the names of the terms of a fraction?
2. What does the denominator of a fraction show?
3. What does the numerator of a fraction show?
4. How do you add fractions that have the same denominator?
5. What is meant by a common denominator?
6. What change do you make in the value of a fraction if you multiply both terms by the same number?
7. How do you find a common denominator of two or more fractions with unlike denominators?
8. What change do you make in the value of a fraction if you divide both terms by the same number?
9. What is meant by reducing a fraction to its lowest terms?
10. What kind of number is $4\frac{2}{3}$?
11. What is a proper fraction?
12. What is the time on the clock on this page?



13. How do you change a mixed number to an improper fraction?

14. How do you change an improper fraction to a mixed number?

15. How do you add fractions that do not have the same denominator?

16. How do you subtract fractions that do not have the same denominator?

17. Draw a straight line 5 inches long.

18. Draw a curved line.

19. What is a right angle?

20. What is the area of a rectangle $\frac{1}{2}$ inch wide and 6 inches long?

21. What is the area of a rectangle that is 1 inch wide and 9 inches long?

22. What is meant by dimensions?

23. What is meant by finding the area of anything?

24. How do you find the area of a rectangle?

Adding Fractions

Add, and write the sums on a folded paper.

	1.	2.	3.	4.	5.
(A)	$\frac{1}{3}$	$\frac{5}{6}$	$\frac{1}{5}$	$\frac{7}{8}$	$\frac{2}{3}$
	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{1}{7}$	$\frac{5}{12}$	$\frac{4}{5}$
(B)	$\frac{5}{8}$	$\frac{3}{5}$	$\frac{2}{9}$	$\frac{3}{4}$	$\frac{5}{8}$
	$\frac{2}{3}$	$\frac{1}{6}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{7}{16}$
	$\frac{1}{4}$	$\frac{7}{8}$	$\frac{2}{3}$	$\frac{2}{3}$	$\frac{2}{3}$

Adding Mixed Numbers

Add, and write the sums on a folded paper.

	1.	2.	3.	4.	5.
(A)	$5\frac{2}{3}$	$6\frac{1}{4}$	$12\frac{1}{2}$	$7\frac{1}{7}$	$33\frac{1}{3}$
	$3\frac{1}{4}$	$8\frac{2}{3}$	$18\frac{3}{4}$	$6\frac{2}{3}$	$46\frac{2}{3}$
(B)	$18\frac{3}{4}$	$37\frac{1}{2}$	$9\frac{3}{4}$	$5\frac{1}{2}$	$17\frac{2}{3}$
	$6\frac{1}{4}$	$18\frac{1}{4}$	$2\frac{1}{3}$	16	$5\frac{1}{9}$
	$12\frac{1}{2}$	$6\frac{3}{4}$	$3\frac{7}{8}$	$8\frac{15}{16}$	$3\frac{3}{4}$

General Review

Here are some questions about what you have studied in arithmetic. Write the numbers 1 to 30 on a sheet of paper and then write the answers after the numbers of the questions.

1. How do you multiply a fraction by a whole number?
2. How does cancellation help in multiplying and dividing fractions?
3. Name the numbers between 52 and 73 that 5 will divide exactly.
4. How do you divide a whole number by a fraction?
5. In dividing by a fraction, what is meant by inverting the divisor?
6. What part of 12 is 9?
7. How do you write a whole number as a fraction?
8. How do you add mixed numbers?
9. How do you subtract mixed numbers?

10. What are the names of all the columns of numbers, beginning with units and going through millions?

11. What are the names of the columns of the first three places to the right of the decimal point?

12. In the number 347.26, what does the 4 mean? The 2? The 3? The 7? The 6?

13. How do you multiply a mixed number by a whole number?

14. How do you multiply a whole number by a mixed number?

15. How do you multiply a mixed number by a mixed number?

16. What does "of" mean whenever it follows a fraction?

17. How do you divide a fraction by a whole number?

18. How do you divide a mixed number by a whole number?

19. How do you divide a mixed number by a fraction?

20. How do you divide a mixed number by a mixed number?

21. In dividing fractions, what is the effect of multiplying both the divisor and the dividend by the same number?

22. What is an easy way to divide 18 by $3\frac{1}{2}$?

23. Write three decimal fractions.

24. Write the Roman numbers for 4, 9, 40, 90, 400, and 900.

25. Write the Roman numbers for 2, 3, 20, 30, 200, 300, 2000, and 3000.

26. Write the Roman numbers for 6, 15, 60, 105, 550, 600, 1100, and 1500.

27. James saw MCMXXVIII on a motion picture reel at the theater. What year did this number represent?

28. Add .9, 5.38, 16, and .371.

29. Subtract 2.378 from 5.1.

30. How many cubic inches are there in a block of wood 6 inches long, 4 inches wide, and 2 inches high?

Subtracting Common Fractions

Subtract, and write the differences on a folded paper.

	1.	2.	3.	4.	5.
(A)	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{5}{8}$	$\frac{6}{7}$
	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{1}{3}$	$\frac{1}{4}$
(B)	$\frac{11}{12}$	$\frac{5}{6}$	$\frac{7}{12}$	$\frac{3}{8}$	$\frac{5}{9}$
	$\frac{1}{5}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{10}$	$\frac{2}{5}$

Subtracting Mixed Numbers

Subtract, and write the differences on a folded paper.

	1.	2.	3.	4.	5.
(A)	$13\frac{3}{4}$	$12\frac{1}{2}$	$18\frac{3}{4}$	$33\frac{1}{3}$	83
	$5\frac{2}{3}$	$7\frac{1}{3}$	$16\frac{1}{2}$	$8\frac{3}{4}$	$47\frac{2}{5}$
(B)	$37\frac{1}{2}$	$41\frac{2}{3}$	$87\frac{1}{2}$	52	$91\frac{2}{3}$
	$15\frac{7}{8}$	17	$16\frac{4}{5}$	$26\frac{2}{3}$	$68\frac{3}{4}$

Multiplying Common Fractions

Copy these examples and multiply:

	1.	2.	3.	4.
(A)	$\frac{2}{3} \times \frac{3}{4}$	$\frac{6}{7} \times \frac{8}{9}$	$\frac{4}{5}$ of $\frac{3}{8}$	$\frac{7}{8} \times \frac{6}{7}$
(B)	$\frac{2}{5}$ of 12	$\frac{3}{5} \times \frac{15}{16}$	$8 \times \frac{2}{9}$	$\frac{3}{4} \times \frac{4}{3}$
(C)	$\frac{5}{6} \times \frac{3}{10}$	$\frac{7}{8}$ of 15	$5 \times \frac{3}{8}$	$\frac{5}{6} \times \frac{12}{5}$

Multiplying Mixed Numbers

Copy these examples and multiply:

	1.	2.	3.	4.
(A)	$18\frac{3}{4} \times 16\frac{2}{3}$	$12\frac{1}{2} \times 8$	$6\frac{2}{3} \times 6\frac{1}{4}$	$5 \times 26\frac{2}{3}$
(B)	$12\frac{1}{2} \times 40$	$16\frac{2}{3} \times \frac{3}{4}$	$2\frac{1}{2} \times 6\frac{2}{3}$	$\frac{2}{3}$ of $18\frac{3}{4}$
(C)	$\frac{5}{8} \times 14\frac{2}{7}$	$41\frac{2}{3} \times \frac{6}{7}$	$\frac{1}{5}$ of $62\frac{1}{2}$	$33\frac{1}{3} \times 37\frac{1}{2}$

Dividing Common Fractions

Copy these examples and find the quotients:

	1.	2.	3.	4.
(A)	$\frac{3}{4} \div \frac{2}{3}$	$\frac{5}{8} \div \frac{5}{6}$	$\frac{2}{3} \div \frac{6}{7}$	$\frac{1}{8} \div \frac{1}{16}$
(B)	$\frac{4}{5} \div \frac{4}{5}$	$\frac{5}{6} \div \frac{3}{4}$	$\frac{2}{5} \div 4$	$\frac{4}{5} \div \frac{1}{3}$
(C)	$8 \div \frac{1}{3}$	$\frac{6}{7} \div \frac{7}{6}$	$\frac{11}{12} \div \frac{1}{4}$	$1 \div \frac{2}{3}$

Dividing Mixed Numbers

Copy these examples and find the quotients:

	1.	2.	3.	4.
(A)	$18\frac{3}{4} \div 12\frac{1}{2}$	$26\frac{2}{3} \div 3\frac{1}{3}$	$75 \div 18\frac{3}{4}$	$7 \div 5\frac{1}{2}$
(B)	$37\frac{1}{2} \div 12$	$68\frac{3}{4} \div 6\frac{1}{4}$	$53\frac{1}{3} \div 6\frac{2}{3}$	$12\frac{1}{2} \div 8\frac{1}{3}$
(C)	$16\frac{2}{3} \div 5$	$93\frac{3}{4} \div 18\frac{3}{4}$	$87\frac{1}{2} \div \frac{1}{2}$	$37\frac{1}{2} \div \frac{2}{15}$

Adding Decimals

Copy these decimals and add:

1. 5.6, .29, .078, and 34
2. .3, .006, 2.87, and 1.4
3. .14, .07, .623, and 3
4. 52, 3.2, 6.15, and .7
5. 2.00, 1.6, 18, 5.3, and 16.02
6. Seven tenths, one and six tenths, eighteen hundredths, and two hundredths
7. Three hundred seventy-six thousandths, five tenths, and four hundredths
8. Two hundred and sixteen thousandths, fourteen hundredths, and three
9. Twenty-seven, eight and four tenths, and two and thirty-four hundredths
10. Three hundred forty-seven thousandths, and three hundred and forty-seven thousandths

Subtracting Decimals

Copy these decimals and subtract:

1. $47.02 - 8.365 = ?$
2. Take 2.34 from 8.
3. What is the difference between 10 and 3.14?
4. $\begin{array}{r} 5.2 \\ .367 \\ \hline \end{array}$
5. What is left if 5.93 is taken from 73.4?
6. Subtract nine and seven tenths from eighteen and four hundredths.
7. $500 - 273.115 = ?$
8. Take .253 from 200.053.

9. What is the difference between 200 and 1.95?

10. Subtract five and eighteen hundredths from thirty-two and six tenths.

Problems

1. Jack's father bought a tractor for $1365. He paid $465 in cash and agreed to pay the balance at the rate of $75 a month. How many months will it take Jack's father to pay for the tractor?

2. In Springfield the rainfall for April last year was 3.75 inches. For August it was 5.16 inches. In which month did it rain more? How much more?

3. How many feet of poultry netting must Mary buy to inclose her garden if it is $49\frac{1}{2}$ feet wide and $62\frac{1}{2}$ feet long? What will the netting cost at 11¢ a yard?

4. A grocer sells canned tomatoes at 18¢ a can or at $3.75 a case containing 2 dozen cans. How much would you save by buying a case instead of buying 2 dozen cans, one can at a time?

5. The salary of the governor of one of our states is $10,000 a year. How much is this a month? Using 365 as the number of days in a year, what is the governor's salary per day?

General Practice 18

Work these examples and problems. Time, 12 minutes.

1.	2.	3.	4.
Add:	Multiply:	Subtract:	Divide:
$\frac{1}{12}$	$13\frac{5}{6} \times 8\frac{3}{4}$	1	$14\frac{2}{3} \div 3\frac{1}{2}$
$\frac{3}{10}$		$\frac{11}{12}$	

5.	6.	7.	8.
Subtract:	Add:	Find:	Subtract:
$18\frac{1}{3}$	$2\frac{7}{8}$	$\frac{2}{3}$ of $19\frac{1}{5}$	$\frac{7}{9}$
$5\frac{7}{8}$	$5\frac{2}{3}$		$\frac{3}{4}$

9. Add 5.4, .632, 8.17, and 24.

10. Subtract .92 from 400.

11. A grain dealer shipped to Chicago 3 carloads of oats, weighing 31,968 pounds, 32,544 pounds, and 31,520 pounds. There are 32 pounds in a bushel of oats. How many bushels did the grain dealer ship in all?

12. Just before Christmas John opened his savings bank and found that he had 7 half dollars, 13 quarters, 18 dimes, 37 nickels, and 52 cents in his bank. If he spent $4.50 of this money for a pair of skates for himself, how much of the money that he had saved was left?

CHAPTER XII

Learning to Multiply and Divide Decimals

Names of Other Columns

You have already learned that the name of the first column to the right of the decimal point is the tenths' column, the second column is the hundredths', and the third column is the thousandths'. The names of the next three decimal columns are ten-thousandths, hundred-thousandths, and millionths, as shown in the table below. Notice the names of the three left-hand columns. Learn these, too.

Hundred-billions	Ten-billions	Billions	Hundred-millions	Ten-millions	Millions	Hundred-thousands	Ten-thousands	Thousands	Hundreds	Tens	Units	Tenths	Hundredths	Thousandths	Ten-thousandths	Hundred-thousandths	Millionths
4	7	5	,	6	0	2	,	3	8	6	,	1	9	5	.	3	1	6	8	4	7

This long number is read "four hundred seventy-five billion, six hundred two million, three hundred eighty-six thousand, one hundred ninety-five and three hundred sixteen thousand, eight hundred forty-seven millionths."

Study these:

.1427 is read "one thousand, four hundred twenty-seven ten-thousandths."
.0416 is read "four hundred sixteen ten-thousandths."
.0084 is read "eighty-four ten-thousandths."
.0007 is read "seven ten-thousandths."
.21467 is read "twenty-one thousand, four hundred sixty-seven hundred-thousandths."
.07543 is read "seven thousand, five hundred forty-three hundred-thousandths."
.00615 is read "six hundred fifteen hundred-thousandths."
.00073 is read "seventy-three hundred-thousandths."
.00009 is read "nine hundred-thousandths."
.473569 is read "four hundred seventy-three thousand, five hundred sixty-nine millionths."
.072804 is read "seventy-two thousand, eight hundred four millionths."
.006475 is read "six thousand, four hundred seventy-five millionths."
.000219 is read "two hundred nineteen millionths."
.000076 is read "seventy-six millionths."
.000005 is read "five millionths."

Be careful in reading such forms as .00005, .500, and 500,000.

.00005 is five hundred-thousandths.
.500 is five hundred thousandths.
500,000 is five hundred thousand.

Notice these:

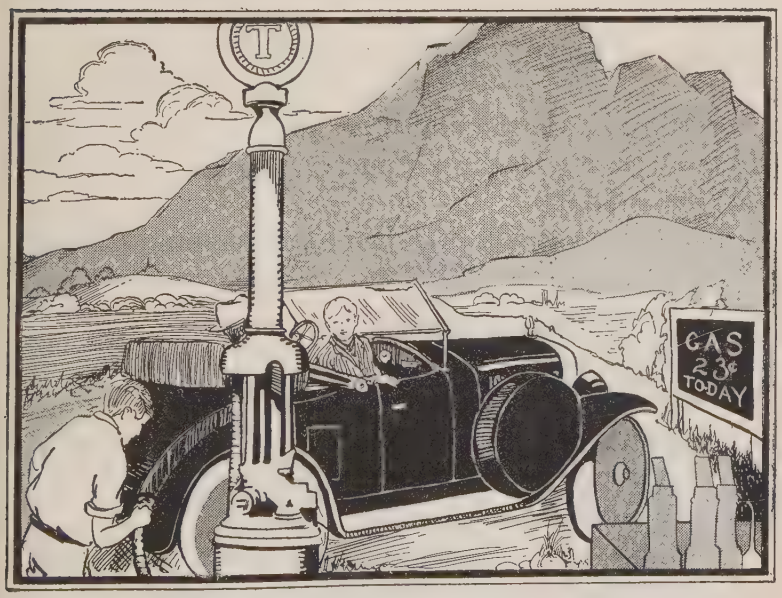
.0417 is four hundred seventeen ten-thousandths.
400.0017 is four hundred and seventeen ten-thousandths.

Reading Decimals

Read these decimals:

	1.	2.	3.	4.
(A)	.0047	.8	.5273	.46473
(B)	200,000	.0009	.14	600.0047
(C)	.02475	.064	.00002	.475
(D)	.07	.00543	.715642	.0647
(E)	400.075	5200.	.00052	.200
(F)	500.00043	.007562	.009	.00007

Multiplying Decimals



John's father bought 15 gallons of gasoline at 23¢ a gallon. What did the 15 gallons of gasoline cost?

$$\begin{array}{r} \$\ .23 \\ 15 \\ \hline 1\ 15 \\ 2\ 3 \\ \hline \$3.45 \end{array}$$

You know that 23¢ = \$.23. If 1 gallon costs 23¢, 15 gallons will cost 15 × 23¢, or 15 × \$.23, which is \$3.45. From this you see that, if there are two decimal places in the multiplicand, there are two decimal places in the product.

At another filling station the price of gasoline was 23.2¢ (read "23 and 2 tenths cents"). What would 15 gallons of gasoline cost at this station?

$$\begin{array}{r} \$\ .232\ (3\ \text{places}) \\ 15 \\ \hline 1\ 160 \\ 2\ 32 \\ \hline \$3.480\ (3\ \text{places}) \end{array}$$

Just as 23¢ = \$.23,
23.2¢ = \$.232.
If 1 gallon cost 23.2¢, or \$.232, 15 gallons would cost 15 × \$.232, which is \$3.480, or \$3.48.

In this problem there are three decimal places in the multiplicand, and there are three decimal places in the product. The answer is \$3.48 (\$3.480 = \$3.48).

The following will help you to understand this.

What is 3 times 5 tenths?
What is 3 times 5 hundredths?
What is 3 times 5 thousandths?

3 × 5 tenths = 15 tenths, or 1 and 5 tenths
3 × 5 hundredths = 15 hundredths
3 × 5 thousandths = 15 thousandths

$3 \times .5 = 1.5$
$3 \times .05 = .15$
$3 \times .005 = .015$

$$\begin{array}{r} .5 \\ \times\ 3 \\ \hline 1.5 \end{array} \qquad \begin{array}{r} .05 \\ \times\ 3 \\ \hline .15 \end{array} \qquad \begin{array}{r} .005 \\ \times\ 3 \\ \hline .015 \end{array}$$

Multiply \$4.75 by 5.

\$4.75
5
\$23.75

You know that, when you multiply a dollars and cents number by some other number, there will be dollars and cents in the answer. That is, if there are two decimal places in the multiplicand, you point off two decimal places in the product. In the same way that you multiply \$4.75 by 5, you can multiply 4.75 by 5: thus:

4.75
5
23.75

That is, $4.75 \times 5 = 23.75$

Multiply .7 by .3.

.7 (1 decimal place) $.7 = \frac{7}{10}$
.3 (1 decimal place) $.3 = \frac{3}{10}$ $\frac{7}{10} \times \frac{3}{10} = \frac{21}{100}$
.21 (2 decimal places) $.21 = \frac{21}{100}$ $.7 \times .3 = .21$

Multiply 3.9 by 2.1.

3.9 (1 decimal place)
2.1 (1 decimal place)
39
78
8.19 (2 decimal places)

What is 3×2? Do you think the answer to this example should be more than 6? Is 3.9 as much as 4? Is 2.1 as much as 3? Do you think the answer could be as much as 4×3, or 12?

Since 3.9 is almost 4 in value and since 2.1 is about 2 in value, do you think that the answer should be about 4×2, or 8?

If you multiply 39 by 21 just as you multiply whole numbers and point off two decimal places in the product, you get 8.19. Does 8.19 seem to be about right?

Are these multiplied right?

Multiply 4.52 by 6.3.

4.5 2
6.3
1 356
27 12
28.476

How many decimal places are there in the multiplicand?

How many decimal places are there in the multiplier?

How many decimal places are there in both the multiplicand and the multiplier together?

Is the number of decimal places in the product equal to the sum of the decimal places in the multiplicand and multiplier?

Multiply 4.37 by 2.03.

4.37
2.03
13 11
8 74 0
8.87 11

Count the number of decimal places in the multiplicand.

Count the number of decimal places in the multiplier.

How many places are there in both?

Count the number of decimal places in the product. Is the number of decimal places in the product equal to the number of decimal places in the other two numbers?

Multiply .17 by .9.

.17 (2 places) $.17 = \frac{17}{100}$
.9 (1 place) $.9 = \frac{9}{10}$
.153 (3 places) $.153 = \frac{153}{1000}$

$\frac{17}{100} \times \frac{9}{10} = \frac{153}{1000}$

$.17 \times .9 = .153$

How many decimal places are there in .17? How many decimal places are there in .9?

How many decimal places should there be in the product?

To multiply decimal fractions, first multiply as in multiplying whole numbers.

Second, count the number of decimal places in the multiplicand and multiplier together.

Third, beginning at the right of the product, point off as many decimal places in the product as there are decimal places in the multiplicand and multiplier together.

Practice in Pointing Off in Multiplying Decimals

The following examples are worked correctly except that the products are not pointed off. Copy the products and put the decimal point in each where it belongs. If you need more decimal places in the product to point off the right number of places, you may write zeros to the left of the product.

	1.	2.	3.	4.	5.
(A)	.73	.086	73.1	29	.417
	4.6	.37	6	34	6.2
	438	602	4386	116	834
	292	258		87	2502
	3358	3182		986	25854
(B)	735	.37	.004	.075	280
	.29	.29	.002	.9	.05
	6615	333	8	675	1400
	1470	74			
	21315	1073			

Practice in Multiplying Decimals

Copy and multiply these numbers.

	1.	2.	3.	4.	5.
(A)	.81	47	8	.46	.376
	.07	32	.7	5	.5
(B)	.8	214	38	.9	.59
	.4	.38	.14	4	.7
(C)	475	6	296	592	.493
	.329	7	.38	318	.204

Problems

In working the following problems, first think about how much the answer ought to be (that is, estimate the answer); second, work the problem; third, compare your answer with your estimate. If your answer does not seem right, go over all your work again.

1. Do you think that 1.8×1.9 is more than .342? Why? Is the decimal point in .342 in the right place? What is the right answer?

2. What will 10 tons of coal cost at $14.75 a ton?

3. When sugar is selling at $.07 a pound, how much will 10 pounds cost?

4. George and his father were taking an automobile trip. George's father said, "George, we have been on the road just exactly an hour, and we have come

35.4 miles." If they kept up that rate for 9 hours, how far would they travel?

5. Do you think that $50.2 \times .49$ (about $\frac{1}{2}$) is more or less than 245.98? Count the number of decimal places in the multiplicand and multiplier and see if you can discover what is wrong.

6. A cubic foot of water weighs 62.5 pounds. What do 7.5 cubic feet of water weigh?

7. A cubic foot of water weighs 62.5 pounds. Gold is 19.34 times as heavy as water. How many pounds does a cubic foot of gold weigh?

8. A schoolroom is 32.5 feet long and 18.75 feet wide. How many square feet of floor space are there in the room?

9. The unit of money in England is called a pound sterling. It is worth $4.8665 in our money. How much money would a man have in United States money if he had 750 pounds sterling (£750) in English money?

10. The distance around a circle is 3.1416 times the distance across and through the middle of it. How far is it around a circle that is 34.5 inches across through the middle?

Multiplying Decimals by 10, 100, and 1000

Multiply 6.25 by 10.

$$\begin{array}{r} 6.25 \\ 10 \\ \hline 62.50 \end{array}$$

If you multiply 6.25 by 10 by the method you have just learned, what do you get? Is there any difference in value between $\frac{50}{100}$ and $\frac{5}{10}$? Is there any difference in value between 62.50 and 62.5?

> Omitting a zero at the right of a decimal fraction does not change its value.

If $6.25 \times 10 = 62.5$, do you see an easy way to get the right answer? Do you see that, if you move the decimal point in 6.25 one place to the right, you get 62.5? What, then, is an easy way of multiplying a decimal fraction by 10?

> To multiply a decimal fraction by 10, move the decimal point one place to the right.

In the same way, we can multiply a decimal fraction by 100 by moving the decimal point two places to the right. Thus, $2.375 \times 100 = 237.5$ and $.471 \times 100 = 47.1$. When the answer is a whole number, the decimal point is not written; thus, $.52 \times 100 = 52$. Sometimes we must annex a zero to the decimal before moving the point. Thus, $.6 \times 100 = .60 \times 100 = 60$.

> To multiply a decimal fraction by 100, move the decimal point two places to the right.

If you multiply any decimal fraction by 1000 by the ordinary way, you will see that you can multiply any decimal fraction by 1000 by moving the decimal point three places to the right. Thus:

$.4175 \times 1000 = 417.5$ $\quad$ $.08745 \times 1000 = 87.45$

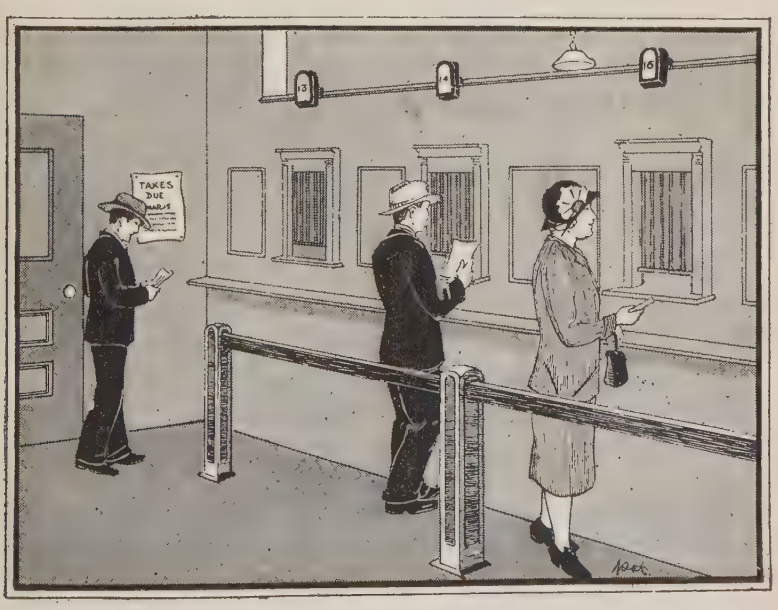
$.396 \times 1000 = 396$ $\quad$ $8.76 \times 1000 = 8760$

To multiply a decimal fraction by 1000, move the decimal point three places to the right.

Problems

1. If pencils cost \$.04 each, what will 100 pencils cost?

2. The tax in a school district in the state where I live is 2.4¢, or \$.024, on each dollar's worth of property. What is the tax rate per hundred dollars?



3. The amount paid for fire insurance in Lakeview is 2.98¢, or \$.0298, for each dollar of insurance. What is the fire insurance rate per hundred dollars of insurance?

4. If the passenger rate on a railroad is 3.6¢ a mile, what is the rate for 100 miles?

5. What will 10 books cost at $2.75 each?

6. If 100 stamped envelopes cost $2.45, what will 1000 stamped envelopes cost at the same rate?

7. What is the cost of 100 golf balls at 65¢ each?

8. What is the cost of 100 2¢ stamps?

9. What will 10 coats cost at $15 each?

10. What will 100 feet of poultry netting cost at 5¢ a foot?

Changing Decimals to Common Fractions

Sometimes you will want to change a decimal fraction to a common fraction. This is the way you can do it.

Change .75 to a common fraction.

$$.75 = \frac{75}{100} = \frac{3}{4}$$

You know that .75 is $\frac{75}{100}$. Reducing $\frac{75}{100}$ to its lowest terms, by dividing both terms by 25, you get $\frac{3}{4}$. Then, $.75 = \frac{3}{4}$.

To prove, you could change $\frac{3}{4}$ back to .75.

Change .875 to a common fraction.

$$.875 = \frac{875}{1000} = \frac{7}{8}$$

To reduce $\frac{875}{1000}$ to its lowest terms, divide both terms by 5 three times or divide by 125 all at once. This gives $\frac{7}{8}$. Then, $.875 = \frac{7}{8}$.

To prove, you could change $\frac{7}{8}$ back to .875.

Change $.58\frac{1}{3}$ to a common fraction.

$$.58\frac{1}{3} = \frac{58\frac{1}{3}}{100} = \frac{175}{300} = \frac{7}{12}$$

Writing $.58\frac{1}{3}$ as a **complex** common fraction — it is called a complex fraction because there is a fraction in one of the terms — you get $\frac{58\frac{1}{3}}{100}$. Multiplying both the numerator and denominator by 3, you get $\frac{175}{300}$. ($58\frac{1}{3} \times 3 = 175$; $100 \times 3 = 300$.) Reducing $\frac{175}{300}$ to its lowest terms, you get $\frac{7}{12}$. Then, $.58\frac{1}{3} = \frac{7}{12}$.

To prove, you could change $\frac{7}{12}$ back to $.58\frac{1}{3}$.

To change a decimal fraction to a common fraction, write the decimal, with the point omitted, as the numerator and write 10, 100, or 1000 as the denominator, depending upon the number of places in the decimal. The number of 0's in the denominator is always the same as the number of places in the decimal. Then reduce the common fraction to its lowest terms.

Practice in Changing Decimals to Common Fractions

Change these decimals to common fractions.

	1.	2.	3.	4.
(A)	.25	.5	.2	$.16\frac{2}{3}$
(B)	.875	.75	$.33\frac{1}{3}$	.4
(C)	.6	$.83\frac{1}{3}$	.125	$.66\frac{2}{3}$
(D)	.58	$.14\frac{2}{7}$	.625	$.91\frac{2}{3}$
(E)	$.08\frac{1}{3}$	.8	$.41\frac{2}{3}$	.375
(F)	.20	$.28\frac{4}{7}$	$.22\frac{2}{9}$	$.58\frac{1}{3}$
(G)	$.11\frac{1}{9}$	.40	$41\frac{2}{3}$	$.42\frac{6}{7}$

General Practice 19

Work these examples and problems. Time, 15 minutes.

1.	2.	3.	4.
Add:	Subtract:	Multiply:	Divide:
401	95,007	432	
112	57,264	29	$82\overline{)4763}$
887			
166			
593			

5.	6.	7.	8.
Write the numerator: $\frac{15}{16} = \frac{?}{32}$	Multiply: .41 .37	Add: $42.7 + .14$	Subtract: $8.6 - .432$

9.	10.	11.	12.
Divide:	Reduce to lowest terms:	Change to a common fraction:	Add:
$38\overline{)17,472}$	$\frac{48}{64}$	.375	5716
			429
			37
			184
			6432

13. If a recipe for 4 people calls for $1\frac{1}{2}$ cups of milk, how much milk would you use to make the recipe suitable for 3 people?

14. When doughnuts cost 20¢ a dozen, how many should you get for 15¢?

15. When doughnuts cost 20¢ a dozen, how much will 15 doughnuts cost?

Dividing Decimals

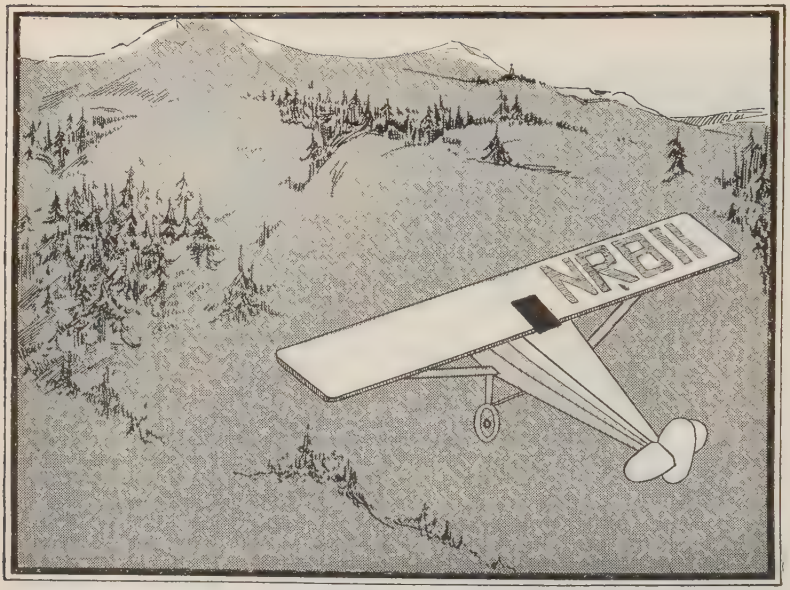
Teacher: Your new arithmetics have just come, and all together they cost \$14.10. There are 15 of you in the class. What will each of you have to pay?

If 15 arithmetics cost \$14.10, 1 arithmetic will cost $\frac{1}{15}$ of \$14.10, or \$14.10 ÷ 15, which is \$.94, or 94¢.

```
   $.94
15)$14.10
   13 5
     60
     60
```

You will notice that there are two decimal places in the dividend and two decimal places in the quotient.

> In dividing a decimal by a whole number, there are as many decimal places in the quotient as there are decimal places in the dividend.



Mary read in the paper that an airplane traveled 428.5 miles in 5 hours. What was the average rate of speed per hour?

$$5\overline{)428.5}\text{ mi.} \qquad 85.7\text{ mi.}$$

If the airplane traveled 428.5 miles in 5 hours, in 1 hour it traveled $\frac{1}{5}$ of 428.5 miles, or 428.5 miles $\div$ 5, which is 85.7 miles. Here you will notice that there is one decimal place in the dividend and one decimal place in the quotient.

> In dividing a decimal by a whole number, the decimal point in the quotient is always over the decimal point in the dividend.

Grace is buying some 2¢ stamps for her father. How many can she get for $5.00?

$$.02\overline{)5.00} = 2\overline{)500}$$
$$250$$

If you move the decimal point two places to the right in .02, you get 2, a whole number; and if you move the decimal point 2 places to the right in 5.00, you get 500, a whole number. As you know, moving the decimal point 2 places to the right in any decimal fraction multiplies the decimal fraction by 100. Multiplying both the divisor and the dividend by 100 does not change the quotient. Then, $5.00 \div .02 = 500 \div 2 = 250$. Since 2¢ buys 1 stamp, $5.00, which is 250 times as much as 2¢, will buy 250 stamps.

Here is a picture of the Southwest Limited. It averages 36.4 miles per hour. How many hours will it take this train to go 546 miles?

$$\begin{array}{r} 15 \\ 364\overline{)5460} \\ 364 \\ \hline 1820 \\ 1820 \\ \hline \end{array}$$

$36.4\overline{)546} = 364\overline{)5460}$

If the train goes 36.4 miles in 1 hour, it will take as many hours for the train to go 546 miles as the number of times 36.4 miles is contained in 546 miles. To find how many times 36.4 is contained in 546, you must divide 546 by 36.4.

Before dividing, you must move the decimal points one place to the right. Moving the decimal point one place to the right in 36.4 gives 364. This, you see, multiplies 36.4 by 10. Then you must also multiply 546 by 10. That is, dividing 5460 by 364 gives exactly the same quotient that dividing 546 by 36.4 does. Dividing 5460 by 364, you get 15. Then, $546 \div 36.4 = 15$, and it would take 15 hours to make the trip.

A rod is 16.5 feet long. How many rods long is a lot that is 140.25 feet long?

$$\begin{array}{r} 8.5 \\ 165\overline{)1402.5} \\ 1320 \\ \hline 82\,5 \\ 82\,5 \\ \hline \end{array}$$

$16.5\overline{)140.25} = 165\overline{)1402.5}$

If a rod is 16.5 feet long, there are as many rods in 140.25 feet as the number of times 16.5 feet is contained in 140.25 feet. To find how many times 16.5 feet is contained in 140.25 feet, you must divide. First make a whole number of the divisor by moving the decimal point one place to the right. This changes 16.5 to 165. Then move the decimal point in the dividend one place to the right. This changes 140.25 to 1402.5. Remember, if you move the point in the divisor, you must always move the point in the dividend, and you must move the point in the dividend just exactly the same number of places as you move

the point in the divisor. Next put a decimal point in the quotient directly over the new decimal point in the dividend. Now divide 1402.5 by 165, just as you divide whole numbers. You first have to divide 1402 by 165. Be sure to write the 8 directly over the 2. Completing the work, you find that 165 is contained in 1402.5, 8.5 times. $140.25 \div 16.5 = 8.5$. Then, 140.25 feet equal 8.5 rods.

From these problems, you see that division of decimals is just like division of whole numbers except for the work with the decimal points. If the divisor is a decimal, move the decimal points in both the divisor and the dividend as many places to the right as there are decimal places in the divisor. The only other new thing is that you have to learn where to put the point in the quotient. The point in the quotient is always directly over the new point in the dividend.

To divide decimals, first move the decimal point in the divisor to the right far enough to make a whole number of the divisor.

Second, move the decimal point in the dividend to the right as many places as the decimal point in the divisor was moved. Annex zeros to the dividend if it is necessary.

Third, put a decimal point in the quotient directly over the new decimal point in the dividend.

Fourth, divide as with whole numbers. Be sure to put the first quotient figure in the proper position.

Practice in Locating the Point in the Quotient

Copy these examples, and without dividing show where the point in the quotient should be.

	1.	2.	3.	4.	5.
(A)	$2\overline{)4.70}$	$.2\overline{)8.4}$	$.3\overline{).57}$	$.05\overline{).75}$	$.03\overline{)6.3}$
(B)	$.4\overline{).864}$	$3\overline{)7.5}$	$.2\overline{)4}$	$.04\overline{).004}$	$.003\overline{)4.14}$
(C)	$.002\overline{)8.4}$	$.08\overline{)8}$	$4\overline{).384}$	$.005\overline{).015}$	$.004\overline{)10}$

Examples for Study

The following examples are worked correctly. Study them.

$5\overline{)835}\ 167$ Here all the numbers are whole numbers. There are no decimal points anywhere.

$5\overline{).15}\ .03$ The thing to notice in this example is the zero in the quotient. If the divisor is not contained in the first figure of the dividend, put a zero in the quotient above the first figure.

$.5\overline{)8.35} = 5\overline{)83.5}\ 16.7$ In this example move the points one place to the right.

$.05\overline{).0835} = 5\overline{)8.35}\ 1.67$ Move the points two places to the right.

$.05\overline{)835} = .05\overline{)835.00} = 5\overline{)83500}\ 16700$ Here you have to annex zeros to the dividend before moving the points.

$$50\overline{)37.5} = 50\overline{)37.50}$$

$$\begin{array}{r} .75 \\ 35\,0 \\ \hline 2\,50 \\ 2\,50 \\ \hline \end{array}$$

In this example you have to annex a zero to the 37.5 to make the work come out even.

Watch for all these things when you are dividing decimals.

Problems

1. Mr. Brown drove 255.5 miles in his automobile in 7 hours. How many miles did Mr. Brown average per hour?

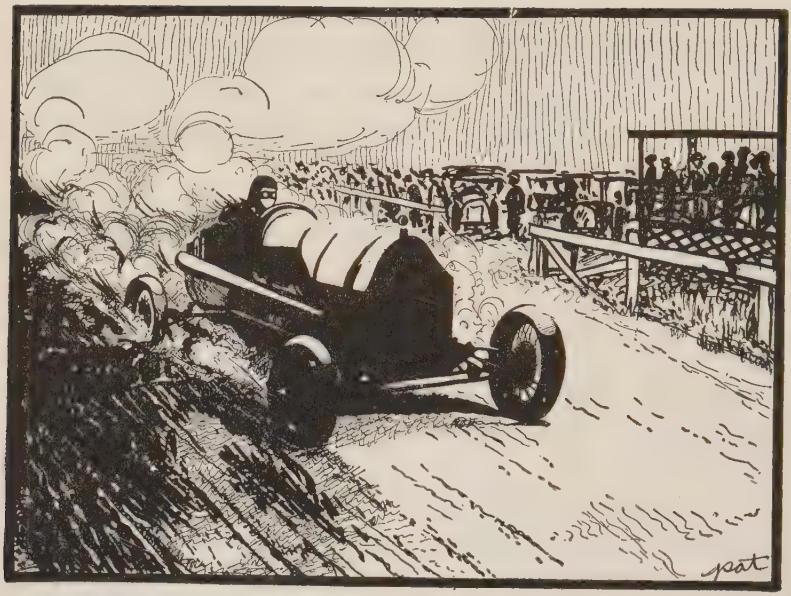
2. In driving around the city, Jack's father drove 187.5 miles on 15 gallons of gasoline. On a long drive through the country, he drove 672 miles on 48 gallons of gasoline. How many miles per gallon of gasoline did Jack's father average in city driving? How many miles per gallon of gasoline did he average in country driving? Was the mileage per gallon of gasoline greater in city driving or in country driving? How much greater?

3. Harry sold a pig to the butcher at 11.5¢ a pound. The butcher weighed the pig and paid Harry $22.54. How much did the pig weigh?

4. Mary's father has a house which he rents for $864 a year. How much rent is that per month?

5. A bushel contains 2150.4 cubic inches. How many cubic inches are there in a peck?

6. At an auction sale on Mr. Wilson's farm, 35 horses were sold for $1968.75. What was the average selling price per horse?



7. In testing an automobile racer, the driver traveled 39.5 miles in 25 minutes. What was the average speed per minute? If he could keep up this rate, how far would he go in an hour?

8. A cubic foot of water is 7.48 gallons. A tank holds 2992 gallons. How many cubic feet of water does the tank hold?

9. George and his father started on an automobile trip to St. Louis. According to the road guide, it is 311.4 miles from the town where they live to St. Louis. If they traveled 34.6 miles the first hour and kept up this rate all the way, how many hours did it take them to reach St. Louis?

10. A cubic foot of water weighs 62.5 pounds. A cubic foot of silver weighs 656.25 pounds. Silver is how many times as heavy as water?

Dividing by 10, 100, and 1000

Divide 84 by 10.

```
  8.4
10)84.0
  80
  4 0
  4 0
  ---
```

Is there really any difference in value between 84 and 84.0? Does writing a decimal point and one or two zeros to the right of a whole number change its value? If you divide 84.0 by 10, you see that the quotient is 8.4. Now compare 84 and 8.4. How do they differ? How could you get 8.4 from 84 without dividing? Would pointing off one decimal place do it? Now work another example.

Divide \$2.30 by 10.

```
 $ .23
10)$2.30
  2 0
   30
   30
   --
```

Dividing \$2.30 by 10, you get \$.23. Now compare \$2.30 and \$.23. What has happened to the decimal point? Can you make a short rule for dividing decimals by 10? Compare your rule with this one.

> To divide a decimal by 10, move the decimal point one place to the left.

In the same way, you can divide a decimal by 100 by moving the point two places to the left. Thus, $437.5 \div 100 = 4.375$, and $4.7 \div 100 = .047$. Notice that you sometimes have to use one or more zeros at the left to fill in the vacant places. Here is another example like that: $5 \div 100 = .05$. For "5" you may

think of a point on the right, thus: "5.". Then, moving the point two places to the left, you get .05.

> To divide a decimal by 100, move the decimal point two places to the left.

If you divide any decimal by 1000, you will see that you can get the quotient most easily by moving the decimal point three places to the left. Thus, $4826.3 \div 1000 = 4.8263$; $847 \div 1000 = .847$; $29.6 \div 1000 = .0296$; $3.5 \div 1000 = .0035$; and $8 \div 1000 = .008$.

> To divide a decimal by 1000, move the decimal point three places to the left.

Now do you think you can make a general rule for dividing any decimal by 10, 100, or 1000? Compare the number of places pointed off with the number of zeros in the divisor. Was your rule about like this?

> To divide a decimal by 10, 100, or 1000, move the decimal point to the left as many places as there are zeros in the divisor.

Problems

1. The freight rate on one kind of merchandise is \$1.35 a hundred pounds. At that rate what would be paid for a 10-pound shipment?

2. Lumber is usually sold by the thousand feet. When oak flooring is selling at \$110 per 1000 feet, what is the price per foot?

3. If a 100-pound sack of sugar can be bought for \$6.50, how much does the sugar cost per pound?

4. If 10 yards of poultry netting cost \$1.20, what is the cost per yard?

5. In roofing, an area that is 10 feet by 10 feet is called a "square." It contains 100 square feet. If a square of roofing costs \$4.75, what is the cost of roofing for 1 square foot?

6. If a carton containing 100 ice cream cones costs 85¢, what is the cost of 1 cone?

7. Mr. Steward raised 3246 bushels of wheat on his 100-acre farm in Oklahoma. What was the average number of bushels raised on 1 acre?

8. At an auction sale Mr. Banks bought a cow for \$49.50. When he drove her on the scale, she weighed exactly 1000 pounds. What did Mr. Banks pay a pound for the cow?

General Practice 20

Work these examples and problems. Time, 15 minutes.

1.	2.	3.	4.
Divide:	Subtract:	Add:	Add:
	$18\frac{1}{7}$	3719	$14\frac{1}{3}$
$29\overline{)37{,}496}$	$5\frac{2}{3}$	426	$2\frac{1}{5}$
		83145	$3\frac{3}{4}$
		2937	$\frac{11}{12}$
		814	
		4076	
		293	

5.	6.	7.	8.
Divide:	Multiply:	Subtract:	Multiply:
	$7\frac{1}{12}$ by $3\frac{2}{5}$	432.7 − .861	4123
$17\overline{)64{,}398}$			65

9. A field is 42 rods long and 32 rods wide. How many square rods are there in it? How many rods is it around the field?

10. It is 330 miles from Milwaukee, Wisconsin, to Duluth, Minnesota. If an airplane leaves Milwaukee at 8 A.M. and averages 100 miles an hour, at what time should it arrive at Duluth?

11. Mr. Jones was paid $25,000 for his 160-acre farm. How much was that an acre?

12. With the $25,000 Mr. Jones bought a home in the city for $8400, bought an automobile for $1195, and put the rest in the bank. How much did Mr. Jones put in the bank?

13. At $4.50 a yard, what will a piece of silk 27 inches long cost?

14. The price of an automobile is $1095 cash or $300 down and $75 a month for 12 months. How much is saved by paying cash?

15. When Mrs. Brown, the farmer's wife, got home from town, she said to her son: "I sold 16 dozen eggs for $4.48. How much per dozen was that, George?" George figured it out for her. How much was it?

Changing Common Fractions to Decimals

You have already learned how to change some common fractions to decimals. You know that $\frac{3}{10}$ can be written as .3, $\frac{17}{100}$ can be written as .17, $\frac{9}{100}$ as .09, $\frac{149}{1000}$ as .149, and so on.

Write the following as decimals:

	1.	2.	3.	4.
(A)	$\frac{1}{10}$	$\frac{7}{100}$	$\frac{245}{1000}$	$\frac{4}{10}$
(B)	$\frac{315}{1000}$	$\frac{2}{10}$	$\frac{19}{100}$	$\frac{18}{1000}$
(C)	$\frac{5}{10}$	$\frac{5}{1000}$	$\frac{3}{10}$	$\frac{72}{1000}$
(D)	$\frac{9}{1000}$	$\frac{6}{10}$	$\frac{4}{100}$	$\frac{9}{10}$
(E)	$\frac{8}{10}$	$\frac{95}{100}$	$\frac{7}{10}$	$\frac{8}{1000}$

There are many common fractions, like $\frac{1}{2}$, $\frac{3}{4}$, $\frac{5}{8}$, that do not have 10, 100, or 1000 as denominators. To change such fractions to decimals requires more work. Here is the way to change fractions like these to decimals.

Change $\frac{1}{2}$ to a decimal.

$$\frac{1}{2} = 2\overline{)1.0}\quad .5$$

You know that $\frac{1}{2} = \frac{5}{10} = .5$. But if you did not know it, you could find it out by writing 1 as 1.0, which does not change its value, and then dividing by the denominator, 2. This gives .5. Then, $\frac{1}{2} = .5$.

Change $\frac{3}{4}$ to a decimal.

$$\frac{3}{4} = 4\overline{)3.00}\quad .75$$

You may know that $\frac{3}{4} = \frac{75}{100} = .75$. But if you did not know it, you could write the numerator 3 as 3.00, which does not change its value, and divide by the denominator, 4. Be sure to put the decimal point in the answer directly over the decimal point in the dividend. Then, $\frac{3}{4} = .75$.

Change $\frac{1}{16}$ to a decimal.

$$\frac{1}{16} = 16\overline{)1.0000}\quad .0625$$

$$\begin{array}{r} 96 \\ \hline 40 \\ 32 \\ \hline 80 \\ 80 \\ \hline \end{array}$$

The only new thing here is the 0 after the decimal point in the quotient. Be sure to put the decimal point in the quotient directly over the decimal point in the dividend. Then think, "16 into 10, 0 time." Write 0 in the answer. Then think, "16 into 100, 6 times." Write 6 in the answer; multiply; subtract; and finish as in long division. Then, $\frac{1}{16} = .0625$.

Sometimes when you divide the numerator by the denominator, the work does not come out even. In such cases, you annex the common fraction that is left at the end. Here is an example like that.

Change $\frac{2}{3}$ to a decimal.

$\frac{2}{3} = 3\overline{)2.00}^{.66\frac{2}{3}}$

Change 2 to 2.00 and divide by 3. Put the decimal point in the quotient. Then think, "3 into 20, 6 times, and 2 over." Write 6. Think, "3 into 20, 6 times and 2 over." Write 6 in the quotient; and since there is 2 over at the end and you are dividing by 3, write the fraction $\frac{2}{3}$ in the answer. Then, $\frac{2}{3} = .66\frac{2}{3}$. If you had divided to the third decimal place, the work would have looked like this:

$$\frac{2}{3} = 3\overline{)2.000}^{.666\frac{2}{3}}$$

Now do you think you can write a rule for changing common fractions to decimals? Try it. Is your rule something like this?

> To change common fractions to decimals, write a decimal point and one or more zeros at the right of the numerator and divide by the denominator.

Practice in Changing Common Fractions to Decimals

Change the following common fractions to decimal fractions. Some of them come out even; some of them do not. In those that do not come out even, divide to

the fourth decimal place and then write the remainder as a common fraction.

	1.	2.	3.	4.	5.	6.	7.
(A)	$\frac{1}{4}$	$\frac{4}{5}$	$\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{6}$	$\frac{2}{3}$	$\frac{1}{12}$
(B)	$\frac{5}{12}$	$\frac{1}{5}$	$\frac{1}{16}$	$\frac{3}{8}$	$\frac{1}{3}$	$\frac{5}{6}$	$\frac{7}{16}$
(C)	$\frac{13}{16}$	$\frac{7}{12}$	$\frac{2}{5}$	$\frac{3}{16}$	$\frac{5}{8}$	$\frac{9}{16}$	$\frac{7}{10}$
(D)	$\frac{3}{4}$	$\frac{15}{16}$	$\frac{11}{12}$	$\frac{3}{5}$	$\frac{5}{16}$	$\frac{7}{8}$	$\frac{11}{16}$

Remainders as Decimals

You have already learned how to write remainders as common fractions, and you have just learned how to change common fractions to decimals. In any example in division, the work may be divided decimally until it comes out even or divided decimally as far as you desire and the remainder written as a common fraction. Here are some examples like that.

$513 \div 12 = 12\overline{)513} = 42\frac{3}{4}$

$$\begin{array}{r} 48 \\ \hline 33 \\ 24 \\ \hline 9 \end{array}$$

$(\frac{9}{12} = \frac{3}{4})$

$$12\overline{)513.00} = 42.75$$

$$\begin{array}{r} 48 \\ \hline 33 \\ 24 \\ \hline 90 \\ 84 \\ \hline 60 \\ 60 \\ \hline \end{array}$$

The above example came out even at the second decimal place. In working examples like this one, be sure to put a decimal point in the quotient just as

soon as you place the decimal point in the dividend. Here is an example that would never come out even.

$$
\begin{array}{r}
53.66\frac{2}{3} \\
12\overline{)644.00} \\
60 \\
\hline
44 \\
36 \\
\hline
80 \\
72 \\
\hline
80 \\
72 \\
\hline
8
\end{array}
\qquad \left(\frac{8}{12} = \frac{2}{3}\right)
$$

To write remainders as decimals, write a decimal point and one or more 0's at the right of the dividend and divide until the work ends or divide until you have as many decimal places as you want and then write the remainder as a common fraction.

Practice in Writing Remainders as Decimals

Divide the following until they come out even or until you have three decimal places:

	1.	2.	3.	4.
(A)	$72\overline{)2790}$	$45\overline{)1470}$	$36\overline{)1017}$	$27\overline{)13{,}563}$
(B)	$16\overline{)3295}$	$75\overline{)6175}$	$12\overline{)3667}$	$60\overline{)4365}$

General Practice 21

Work these examples and problems. Time, 15 minutes.

1.	2.	3.	4.
Add:	Multiply:	Divide:	Subtract:
$3\frac{1}{5}$	402		15 lb. 2 oz.
$\frac{7}{8}$	603	5)$8.75	8 lb. 10 oz.
$19\frac{3}{4}$			

5.	6.	7.	8.
Multiply:	Reduce to	Write in	Add:
$5.93	lowest	figures:	4.7 + .68 + 3.72
18	terms:	Three hundred	
	$\frac{336}{384}$	seventy-five	
		thousandths	

9. George caddies at the golf club. On Monday he earned 50¢; on Tuesday, 95¢; on Wednesday, 35¢; on Thursday, 60¢; on Friday he did not work; and on Saturday, he earned $1.30. If he spent 30¢ for refreshments during the week and 50¢ for street-car fare, how much did George have left from his week's earnings?

10. Mr. Williams took his family to the circus. Tickets for grown-ups cost $1.25 each, and tickets for children cost 50¢ each. Reserved seats are 25¢ extra. Mr. Williams bought 3 tickets at $1.25, 2 tickets at 50¢, and 5 reserved seat tickets. How much did they all cost?

11. Last month the milkman left at our house 63 quarts of milk and 7 pints of cream. He charges 12¢ a quart for milk and 25¢ a pint for cream. What was the total bill for milk and cream last month?

12. One day Jack said to the class, "Choose any number, multiply it by 8, add 14, divide by 2, subtract 4 times the first number, and you will have 7." Was Jack right?

13. One year oats sold at 37¢ a bushel in August and at $56\frac{1}{2}$¢ a bushel in December. In which month did oats cost more? How much more per bushel?

14. Henry was sent to the bank with $15 to get $10 worth of quarters and $5 worth of dimes. How many coins should he have received in all?

15. Which is more, and how much, $\frac{5}{9}$ of a yard or $\frac{7}{12}$ of a yard?

Chapter Review

Here is a review of what you have studied in this chapter. Write the numbers 1 to 25 on a sheet of paper. After each number you have written, write the answer to the question that has the same number.

At the end of each question you will see a page number. If you missed any part of the test, turn back to the page number given after that part of the test, where you will find how to answer what you missed. Study what you missed until you are sure you know what to do. Then go back to the chapter review and again try the part you missed. Do this until you do not miss anything or until your teacher tells you to work on something else.

1. Multiply $.18 by 32. (Page 216)

2. Multiply 24.5¢ by 16. (Page 216)

3. How do you know the number of decimal places to point off in multiplying decimals? (Page 219)

4. Multiply 4.7 by 3.2. (Page 217)

5. Multiply .18 by .9. (Page 218)

6. Multiply .743 by .406. (Page 219)

7. Without doing any written work tell whether 3.8×5.9 is more or less than 24. (Page 217)

8. What is the quickest and easiest way to multiply any decimal by 10? By 1000? By 100? (Page 221)

9. Divide \$14.75 by 25. (Page 227)

10. Divide 300 by .03. (Page 229)

11. How do you make a whole number of a divisor that is a decimal fraction? (Page 231)

12. In dividing decimals, if you move the decimal point in the divisor three places to the right, how many places do you move the decimal point in the dividend? (Page 231)

13. Divide 96 by .3. (Page 232)

14. Divide 9.6 by 3. (Page 232)

15. Divide 360 by .012. (Page 232)

16. What is the quickest and easiest way to divide any decimal fraction by 10? By 1000? By 100? (Page 235)

17. Write $\frac{425}{1000}$ as a decimal. (Page 239)

18. Write $\frac{6}{100}$ as a decimal. (Page 239)

19. Write $\frac{8}{1000}$ as a decimal. (Page 239)

20. Write $\frac{17}{1000}$ as a decimal. (Page 239)

21. Change $\frac{7}{8}$ to a decimal. (Page 240)

22. Change $\frac{1}{12}$ to a decimal, carrying your work out to the fourth decimal place. (Page 241)

23. Tell how to change any common fraction to a decimal. (Page 241)

24. Change $\frac{13}{16}$ to a decimal. (Page 240)

25. Divide 675 by 12 until it comes out even. (Page 242)

CHAPTER XIII

Multiplying and Dividing Denominate Numbers

Multiplying Denominate Numbers

It takes Mr. Mathews 45 minutes each morning to ride from his home in the country to his work in the

city, and it takes the same time to get home in the evening. How much time does this take each day?

$$\begin{array}{r} 45 \text{ min.} \\ \times \quad 2 \\ \hline 90 \text{ min.} = 1 \text{ hr. } 30 \text{ min.} \end{array}$$

You can see that, if it takes 45 minutes to make one trip, it will take 2×45 minutes, or 90 minutes, to

make 2 trips. But 90 minutes is more than 1 hour. As you know, there are only 60 minutes in 1 hour; so 90 minutes is the same as 1 hour and 30 minutes. You should always change numbers like 90 minutes to higher denominations.

If it takes Mr. Mathews 1 hour, 30 minutes each day to go to and from his work, how much time will this amount to in 6 days?

1 hr. 30 min.
× 6
6 hr. 180 min. =

6 hr.
3 hr.
9 hr.

If it takes 1 hour, 30 minutes each day, in 6 days it will take 6 × 1 hour, 30 minutes. To get the answer, you must multiply. 6 × 30 min. = 180 min., and 6 × 1 hr. = 6 hr. But 180 minutes is more than 1 hour. As you know, there are 60 minutes in 1 hour; so 180 minutes is 3 hours. Then, 6 hr. and 180 min. = 6 hr. and 3 hr., or 9 hr. all together.

To work problems like these, you must know how to change denominate numbers from lower to higher denominations and you must know how to multiply the separate parts of the denominate numbers.

Study these:

4 lb. 5 oz.
× 7
28 lb. 35 oz.

7 × 5 oz. = 35 oz. = 2 lb. 3 oz.
7 × 4 lb. = 28 lb.

2 lb. 3 oz.
28 lb.
30 lb. 3 oz.

2 lb. 3 oz. + 28 lb. = 30 lb. 3 oz.
Then, 7 × 4 lb. 5 oz. = 30 lb. 3 oz.

9 ft. 11 in.	8×11 in. = 88 in. = 7 ft. 4 in.
8 in.	$8 \times$ 9 ft. = 72 ft.
72 ft. 88 in.	
7 ft. 4 in.	
72 ft.	7 ft. 4 in. + 72 ft. = 79 ft. 4 in.
79 ft. 4 in.	Then, $8 \times$ 9 ft. 11 in. = 79 ft. 4 in.

Practice in Reducing Denominate Numbers to Lower Denominations

Think the right answers for these:

1. 1 ft. = __?__ in.		**11.** 3 ft. = __?__ in.	
2. 1 hr. = __?__ min.		**12.** 5 lb. = __?__ oz.	
3. 1 lb. = __?__ oz.		**13.** 4 min. = __?__ sec.	
4. 2 da. = __?__ hr.		**14.** 2 hr. = __?__ min.	
5. 4 lb. = __?__ oz.		**15.** 5 hr. = __?__ min.	
6. 2 ft. = __?__ in.		**16.** 4 ft. = __?__ in.	
7. 1 gal. = __?__ qt.		**17.** 5 wk. = __?__ da.	
8. 3 lb. = __?__ oz.		**18.** 2 lb. = __?__ oz.	
9. 3 bu. = __?__ pk.		**19.** 3 hr. = __?__ min.	
10. 4 hr. = __?__ min.		**20.** 5 ft. = __?__ in.	

Problems

1. Helen practices her music lesson 1 hr. 45 min. each day. She does not practice on Sunday. How many hours and minutes does this amount to in a week of 6 days? In 4 weeks?

2. Henry's uncle has an acre of strawberries in the form of a square garden. It is 208 ft. 9 in. square. How many feet of fencing will he need to go around it?

3. Tom heard his father say to a neighbor, "My wheat averaged 32 bu. 3 pk. to the acre, and I had

50 acres in wheat." How many bushels of wheat did Tom's father raise that year?

4. In a factory it is found that it takes 2 yd. 1 ft. of trimming for a dress. How much trimming will it take for 50 dresses like that?

5. If the arithmetic recitation lasts 30 minutes each day, how much time is spent on arithmetic each full school week?

General Practice 22

Work these examples and problems. Time, 15 minutes.

1.	2.	3.	4.
Add:	Subtract:	Subtract:	Multiply:
202	81,972	\$569,835	5104
445	26,083	59,389	137
734			
221			
678			
166			
529			

5.	6.	7.	8.
Add:	Subtract:	Multiply:	Divide:
$\frac{5}{8}$	$\frac{11}{12}$	$14\frac{1}{5} \times 7$	
$\frac{7}{12}$	$\frac{2}{3}$		$19\overline{)\$4732}$

9.	10.	11.	12.
Add:	Multiply:	Divide:	Subtract:
$810.04 + .397 + 26.1$	586		40,100
	.351	$37\overline{)5000}$	2,897

13. On an automobile trip Jane and her father traveled 94.6 miles on 5.5 gallons of gasoline. How many miles per gallon did they average?

14. One grocer advertises grapefruit at 2 for 15¢. Another grocer advertises them at 3 for 25¢. Which price is cheaper? How much?

15. The fare from New York to Chicago on one railroad is $50.10. The distance on this road is 908 miles. What is the average fare per mile?

Practice in Changing Denominate Numbers

On a sheet of paper change the following denominate numbers as indicated.

1. 7 yd. 2 ft. = __?__ ft.
2. 8 gal. 3 qt. = __?__ qt.
3. 17 min. 45 sec. = __?__ sec.
4. 5 wk. 3 da. = __?__ da.
5. 3 sq. ft. 20 sq. in. = __?__ sq. in.
6. 2 T. 240 lb. = __?__ lb.
7. 5 doz. 8 things = __?__ things.
8. 2 mi. 100 rd. = __?__ rd.
9. 24 lb. 6 oz. = __?__ oz.
10. 6 ft. 5 in. = __?__ in.
11. 329 ft. = __?__ yd. __?__ ft.
12. 78 qt. = __?__ gal. __?__ qt.
13. 342 sec. = __?__ min. __?__ sec.
14. 52 da. = __?__ wk. __?__ da.
15. 405 sq. in. = __?__ sq. ft. __?__ sq. in.
16. 4572 lb. = __?__ T. __?__ lb.
17. 149 things = __?__ doz. __?__ things.
18. 500 rd. = __?__ mi. __?__ rd.

19. 258 oz. = __?__ lb. __?__ oz.
20. 115 in. = __?__ ft. __?__ in.

Dividing Denominate Numbers

Mary found a piece of rope that was 25 feet, 6 inches long, which her father told her she could cut into 3 equal lengths for skipping ropes. How long could Mary make each skipping rope?

$$3\overline{)25 \text{ ft. } 6 \text{ in.}}\quad 8 \text{ ft. } 6 \text{ in.}$$

This is a problem in division. Dividing 25 feet by 3, you get 8 feet, and there is 1 foot over because 3×8 feet is only 24 feet. 1 ft. = 12 in. Adding the 12 inches left over to the 6 inches, you get 18 inches. Dividing 18 inches by 3, you get 6 inches. Then, 25 ft. 6 in. $\div$ 3 = 8 ft. 6 in.

Study these:

$$\begin{array}{r} \text{3 lb. 7 oz.} \\ 5\overline{)\text{17 lb. 3 oz.}} \end{array}$$

17 lb. ÷ 5 = 3 lb., with 2 lb. over
2 lb. = 2 × 16 oz. = 32 oz.
32 oz. + 3 oz. = 35 oz.
35 oz. ÷ 5 = 7 oz.

Then, 17 lb. 3 oz. ÷ 5 = 3 lb. 7 oz.

$$\begin{array}{r} \text{2 qt. 1 pt.} \\ 8\overline{)\text{20 qt. 0 pt.}} \end{array}$$

20 qt. ÷ 8 = 2 qt., with 4 qt. over
4 qt. = 4 × 2 pt. = 8 pt.
8 pt. ÷ 8 = 1 pt.

Then, 20 qt. 0 pt. ÷ 8 = 2 qt. 1 pt.

$$\begin{array}{r} \text{1 hr. 27 min.} \\ 5\overline{)\text{7 hr. 15 min.}} \end{array}$$

7 hr. ÷ 5 = 1 hr., with 2 hr. over
2 hr. = 120 min.
120 min. + 15 min. = 135 min.
135 min. ÷ 5 = 27 min.

Then, 7 hr. 15 min. ÷ 5 = 1 hr. 27 min.

Practice in Changing Denominate Numbers from Lower to Higher Denominations

Think the right answers for these:

1. 54 in. = __?__ ft. __?__ in.
2. 18 pk. = __?__ bu. __?__ pk.
3. 84 oz. = __?__ lb. __?__ oz.
4. 17 qt. = __?__ gal. __?__ qt.
5. 145 min. = __?__ hr. __?__ min.
6. 192 sec. = __?__ min. __?__ sec.
7. 56 hr. = __?__ da. __?__ hr.
8. 25 pt. = __?__ qt. __?__ pt.
9. 19 ft. = __?__ yd. __?__ ft.
10. 15 mo. = __?__ yr. __?__ mo.

General Practice 23

Work these examples and problems. Time, 15 minutes.

1.	2.	3.	4.
Multiply:	Add:	Divide:	Subtract:
897	41.28		8492
76	890.147	79)2528	7687
	27.		
	698.		
	1.08		

5.	6.	7.	8.
Reduce to lowest terms: $\frac{80}{96}$	Multiply: 42.6 43	Change to a common fraction: .875	Divide: 47)4324

9.	10.	11.	12.
Subtract:	Subtract:	Add:	Divide:
584.3 − 29.87	867.9	461	
	789.64	92	49)11,124
		840	
		69	
		24	
		761	

13. In the summer, when eggs were cheap, Mrs. Clark packed 25 dozen, at 28¢ a dozen, for winter use. In the winter eggs sold for an average of 54¢ a dozen. If it cost 58¢ for packing the eggs, how much did Mrs. Clark save by packing them in the summer?

14. Henry said, "Father, how far is it from here to Chicago?" Henry's father replied: "Three-fourths of the distance is 384 miles. See if you can figure out how far it is." Henry figured it out and got it right. Can you? How far was it?

15. It takes George 12.8 seconds to run 100 yards. That is the same as how many feet per second?

Addition Practice

Add, and write the sums on a sheet of paper placed under the examples.

1.	2.	3.	4.	5.	6.
512	28	684	5105	741	279
2354	146	719	352	802	304
167	284	28	569	280	91
631	3451	390	720	197	132
898	739	165	816	603	458
429	218	850	654	974	726
653	473	4631	203	524	845
872	596	287	92	365	280
26	735	473	618	156	864
741	652	352	940	980	713

Problems

1. A merchant had left on a roll a piece of narrow ribbon 2 yards, 2 feet long. He cut it up for wrist watch ribbons into 8 equal parts. How long was each wrist watch ribbon?

2. Just before final examinations James studied his history 2 hours, 45 minutes all together during 3 evenings. What was the average number of minutes James spent in studying his history?

3. William had a board that was 14 feet, 4 inches long. "How in the world can I divide this into 4 equal lengths?" said William. Jack replied, "All you have to do is to divide 14 feet, 4 inches by 4." "But that is the part I can't do," said William. "Well, then, I'll show you," said Jack. Could you have worked William's problem? Show how.

4. Mr. Thompson had 25 bushels of potatoes which he wanted to put into 10 sacks. If he put the same

amount into each sack, how many bushels and pecks of potatoes would there be in each sack?

5. If 21 pounds of sugar is put up into 24 boxes, each containing the same weight, how many ounces can be put into each box?

General Practice 24

Work these examples and problems. Time, 15 minutes.

1.	2.	3.	4.
Add:	Multiply:	Subtract:	Divide:
527	\$3784	37,041	
38	207	2,998	732)\$150,060
642			
37			
9			
84			
6152			

5.	6.	7.	8.
Reduce to lowest terms: $\frac{84}{108}$	Multiply: 57.3 .018	Change 75 ft. 8 in. to inches.	Subtract: 5.7 − 2.893

9. School starts at 8:15 A.M. and closes at 11:50 A.M. It starts again at 1:15 P.M. and closes at 3:55 P.M. How many hours and minutes is school in session each day?

10. Mary's birthday is October 12. How many days is it from March 28 to Mary's birthday?

11. By measuring with a ruler the distance between the cities on a map, Ray found that the distance be-

tween Los Angeles, California, and Austin, Texas, was 11.7 inches. If 1 inch on the map represented 110 miles of actual distance how many miles is it from Los Angeles to Austin?

12. Which is more and how much, two hundred fifty-three thousandths or two hundred and fifty-three thousandths?

13. How many weeks is it from October 2 until Christmas?

14. How many hours and minutes is it from 8:15 P.M. Monday until 6:30 A.M. Thursday?

15. At any given time, it is 3 hours, 1 minute, 35 seconds, earlier in San Francisco than it is at that same instant in New York City. When it is noon in New York City, what is the exact time in San Francisco?

Chapter Review

On page 259 is a review of what you have studied in this chapter. Write the numbers 1 to 20 on a sheet of paper. After each number you have written, write the answer to the question that has the same number.

At the end of each question you will see a page number. If you missed any part of the test, turn back to the page number given after that part of the test, where you will find how to answer what you missed. Study what you missed until you are sure you know what to do. Then go back to the chapter review and again try the part you missed. Do this until you do not miss anything or until your teacher tells you to work on something else.

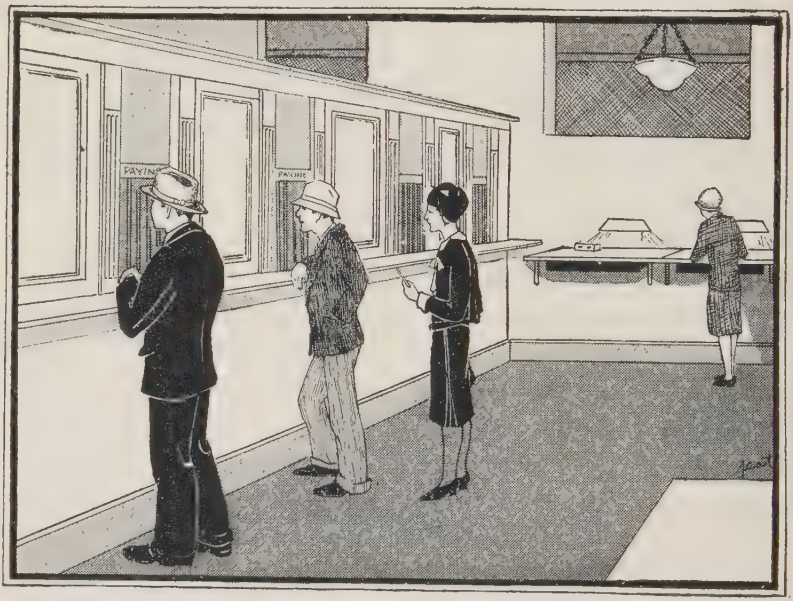
1. Multiply 35 minutes by 16. (Page 247)
2. Multiply 2 hours, 15 minutes by 7. (Page 248)
3. 64 inches = _?_ feet, _?_ inches. (Page 251)
4. 73 ounces = _?_ pounds, _?_ ounces. (Page 251)
5. 84 minutes = _?_ hours, _?_ minutes. (Page 251)
6. 4 feet, 7 inches = __?__ inches. (Page 249)
7. 5 pounds, 9 ounces = __?__ ounces. (Page 249)
8. 7 hours, 18 minutes = __?__ minutes. (Page 249)
9. Multiply 4 pounds, 13 ounces by 9. (Page 248)
10. Multiply 7 feet, 11 inches by 8. (Page 249)
11. Divide 5 hours by 2. (Page 252)
12. Multiply 5 days, 3 hours by 9. (Page 248)
13. Divide 3 hours, 45 minutes by 5. (Page 253)
14. Multiply 6 pounds, 8 ounces by 3. (Page 248)
15. 5 hours, 19 minutes = __?__ minutes. (Page 249)
16. Divide 24 pounds, 8 ounces by 7. (Page 253)
17. 8 feet, 7 inches = __?__ inches. (Page 249)
18. Divide 82 feet, 6 inches by 9. (Page 252)
19. Multiply 27 inches by 4. (Page 247)
20. Divide 17 pounds, 8 ounces by 5. (Page 253)

CHAPTER XIV

Banks and Bank Accounts

What a Checking Account Is

If you had a thousand dollars, would you want to keep it in your house? Why? Would you want to carry a thousand dollars in your pocket? Why? If



you owed a grocery store $45, would you want to pay the bill with cash? Why? Of course you would not want to keep as large a sum of money as $1000 in your house or carry that much money in your pocket.

You might lose it or be robbed of it. But where could you put your money? Yes, you could put your money in a bank, where it would be safe. Banks keep your money and make it possible for you to pay bills by mailing checks instead of carrying the cash to each place where you owe bills. Banks keep a record of the money you put into them and the money you pay out.

When a person first puts money into a bank, we say that he has "opened an account" with the bank. You can put your money into a bank under two kinds of arrangements. Under one arrangement, you will use your money to pay bills or to draw out cash for spending money or for small purchases that you may make. In other words, you will write checks against this account and put money in from time to time. This kind of account is called a **checking account.** Under the other arrangement, you leave your money in the bank for a long time and do not write checks against the account. For the use of the money in this account, the bank pays you money called interest. You will learn about interest later. This kind of account is called a **savings account.** In another chapter, you will learn about savings accounts. This chapter will teach you about checking accounts.

Here is a list of the things you need to know in keeping a checking account:

1. How to open a checking account
2. How to make deposits (put money into a bank)
3. How to indorse checks
4. How to write checks
5. How to keep a check book
6. The importance and use of bank statements

Opening a Checking Account

Henry Jones had been selling papers and getting subscriptions for several magazines. His mother had been keeping his money for him at home, but one morning Henry's mother discovered that Henry had collected too much money to keep around the house. She suggested that Henry go to the bank and open a bank account. Henry thought this a fine idea; so he went to the Bank of Wisconsin to open an account.

When Henry got into the bank, he noticed a sign that had on it "New Accounts"; he decided this was where he should go. He went up to the man at the desk where this sign was. Henry noticed a sign on the man's desk that read "Mr. Buck"; and he decided that this was the man's name. Henry and the man shook hands, and Henry said, "I want to put some money in the bank." Mr. Buck replied: "That is fine. You want to open an account. Do you want to open a savings account or a checking account?" Now Henry had not learned the difference between a checking account and a savings account; so Mr. Buck explained the difference to him, just as it was explained to you on page 261. (If you have forgotten the difference, read page 261 and review it.)

Henry decided that he wanted to open a checking account. Mr. Buck thought a checking account the right kind of account for Henry to open, since Henry wanted to buy some books and clothes from the money he was putting into the bank. The first thing Mr. Buck told Henry he must do was to write his name on a card just the way he would write his name on the

checks he was going to write. This is called a **signature card.** Why does a bank want a person's signature?

Making a Deposit

Mr. Buck: Now, Henry, how much money have you to deposit?

Henry: I have one ten-dollar bill, two five-dollar bills, ten half dollars, eight quarters, eleven dimes, and ten nickels.

Mr. Buck: That is splendid. I hope you will keep on working and saving. Now you are ready to make your deposit.

When you come to the bank to make a deposit, the first thing you must do is to fill out a **deposit slip** like the one here. You will always find these deposit slips near the blank checks on one of the tables in the bank. You see, Henry, there are places on the deposit slip for listing four different forms of money: currency, gold, silver, and checks. Currency, you know, means paper money, and of course you know the silver money. Pennies are counted in with the silver money. You probably will get little

DEPOSITED WITH

BANK OF WISCONSIN

BY_____

_____

MADISON, WIS., _____ 192 _

PLEASE LIST EACH CHECK SEPARATELY

	DOLLARS	CENTS	DOLLARS	CENTS
CURRENCY				
GOLD				
SILVER				
CHECKS				
TOTAL $				

In receiving items for deposit or collection, this Bank acts only as depositor's collecting agent and assumes no responsibility beyond the exercise of due care. All items are credited subject to final payment in cash or solvent credits. This Bank will not be liable for default or negligence of its duly selected correspondents nor for losses in transit, and each correspondent so selected shall not be liable except for its own negligence.

This Bank or its correspondents may send items, directly or indirectly, to any Bank including the payor, and accept its draft or credit as conditional payment in lieu of cash; it may charge back any item at any time before final payment, whether returned or not, also any item drawn on this Bank not good at close of business on day deposited.

gold money; and since you have no checks to deposit, I shan't tell you about depositing checks till later. Now we will make out a deposit slip for the money you want to deposit. First, you must see how much currency you have, then how much silver. You have twenty dollars in currency and eight dollars and sixty cents in silver; so your deposit slip for this money looks like this.

DEPOSITED WITH

BANK OF WISCONSIN

BY Henry Jones

2436 Van Hise

MADISON, WIS., June 6, 1928

PLEASE LIST EACH CHECK SEPARATELY

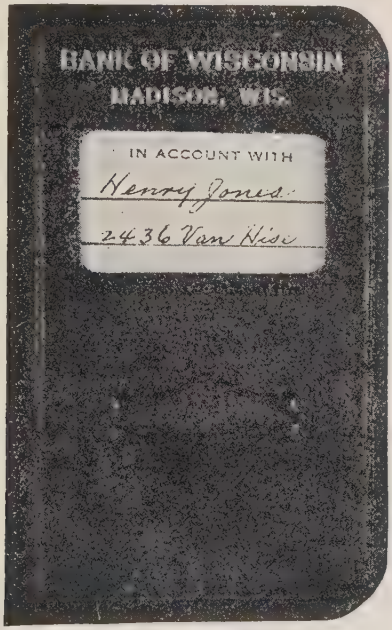
	DOLLARS	CENTS	DOLLARS	CENTS
CURRENCY	20	00		
GOLD				
SILVER	8	60		
CHECKS				
TOTAL $	28	60		

In receiving items for deposit or collection, this Bank acts only as depositor's collecting agent and assumes no responsibility beyond the exercise of due care. All items are credited subject to final payment in cash or solvent credits. This Bank will not be liable for default or negligence of its duly selected correspondents nor for losses in transit, and each correspondent so selected shall not be liable except for its own negligence. This Bank or its correspondents may send items, directly or indirectly, to any Bank including the payor, and accept its draft or credit as conditional payment in lieu of cash; it may charge back any item at any time before final payment, whether returned or not, also any item drawn on this Bank not good at close of business on day deposited.

Now here is a deposit book, or **pass book,** in which will be kept a record of all your deposits. It is really your receipt book for your deposits, and you should always bring it with you when you come to the bank to make deposits. If, by any chance, you do not bring your pass book with you, you must make out two deposit slips.

After you have made out the deposit slip, you should take the deposit slip with the money and your pass book to a window with the sign "Receiving" over it. Then you must give the deposit slip, with your money and your pass book, to the man at that receiving window. The man is called a **receiving teller.** He will count your money, check your deposit slip to see if

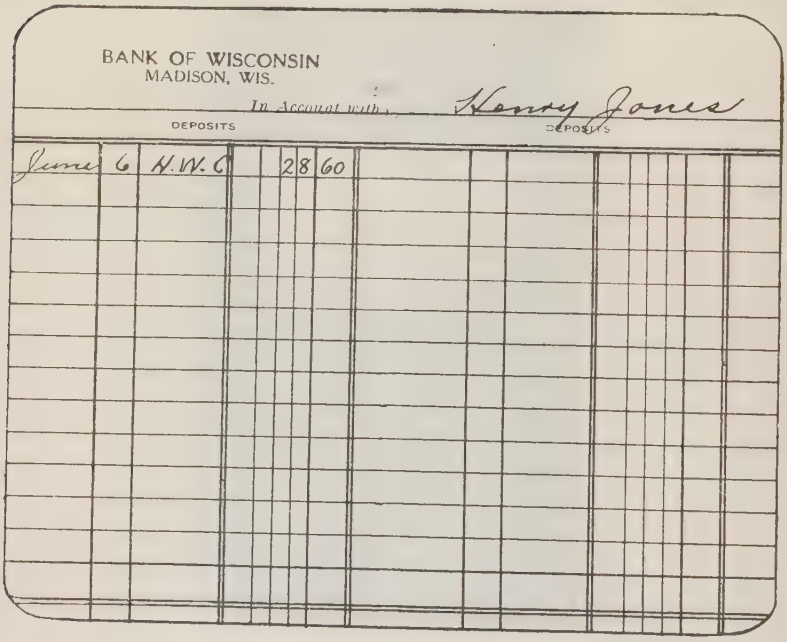
you recorded the different amounts of money correctly, record the total amount of your deposit in your pass book, and give your pass book back to you. Now do you see how your pass book is really your receipt book? If you ever come to the bank without your pass book, remember I told you to make out two



deposit slips, which you should give to the receiving teller with your money. Then he will sign his initials on one of the deposit slips, and it will be your receipt instead of your pass book. Always be sure to get your deposits recorded by the teller in your pass book or get a signed deposit slip. You should always get a receipt of some kind for any money you spend or deposit. Now we will deposit your money, and

your checking account will be opened. We are glad to have you as a depositor in the Bank of Wisconsin, Henry, and I hope you will keep your account here all your life.

Henry: Thank you very much, Mr. Buck. I am proud to have my money in the Bank of Wisconsin.


BANK OF WISCONSIN
MADISON, WIS.

In Account with Henry Jones

DEPOSITS						DEPOSITS											
June	6	H.W.C.			28	60											

I am going to try to make lots of money and always keep my account here.

Questions about Opening a Checking Account

1. What is the difference between a checking account and a savings account?

2. What do we call the man who receives deposits at the bank?

3. What is a pass book? Of what value is a pass book to a depositor?

4. What is a deposit slip?

5. If you wanted to deposit money in the bank and had left your pass book at home, how could you make the deposit?

6. Why did Henry decide to open a checking account instead of a savings account?

Making Deposits

During the week following the opening of Henry's checking account, he made the following deposits on the dates that are given. Make out deposit slips as for a bank in your town or city and find out how much money Henry deposited on each of the three days. Then find out how much he deposited in the three days together.

June 8: Silver, $1.45; currency, $3.00
June 9: Silver, $2.60; currency, $4.00
June 11: Silver, $3.40; currency, $2.00

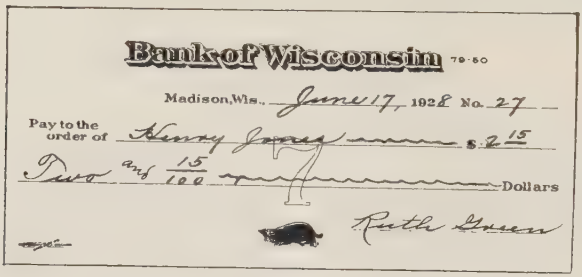
Subtraction Practice

Subtract, and write the differences on a folded paper.

	1.	2.	3.	4.
(A)	31,227	91,011	375,656	46,885
	23,456	23,455	144,697	24,977
(B)	15,543	63,243	92,092	51,202
	7,802	10,354	2,233	45,104
(C)	63,819	100,192	818,512	91,269
	16,589	55,717	9,901	31,487

Indorsing Checks

About ten days after Henry had opened his checking account, he went into the bank to deposit some money, and besides some bills and silver he had three checks that some of the subscribers had given him in payment for their magazines. Now Mr. Buck had not

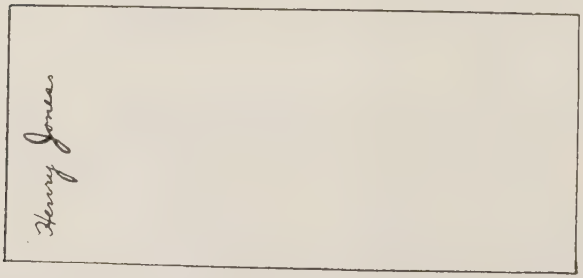

Bank of Wisconsin 79-60

Madison, Wis., June 17, 1928 No. 27

Pay to the order of Henry Jones $2.15

Two and 15/100 Dollars

Ruth Green


Henry Jones

told Henry how to deposit checks; so Henry went up to him and said, "Good morning, Mr. Buck."

Mr. Buck: Good morning, Henry. How is our new depositor this morning?

Henry: Fine, thank you, sir, but I need some help in depositing these checks because, when I opened my account, you did not tell me how to deposit checks.

Mr. Buck: That is right. I didn't tell you last week how to deposit checks because I thought you

would not remember it until you actually had some checks to deposit. Now that you do have some checks to deposit, it will be very easy. May I see one of the checks you have? The first thing you should always do when someone gives you a check is to see that it is made out correctly. Be sure that the check is dated, that the amount of money written in figures is the same amount as that written in words, and that the check is signed. When you want to deposit a check, the first thing you must do is to **indorse** it. To indorse a check means to write your name on the back of the check. You should always turn the check over and write your name across the left end. Now, Henry, indorse this check.

DEPOSITED WITH

BANK OF WISCONSIN

BY Henry Jones

2436 Van Hise

MADISON, WIS., June 17, 1928

PLEASE LIST EACH CHECK SEPARATELY

	DOLLARS	CENTS	DOLLARS	CENTS
CURRENCY	4	00	1	1
GOLD			2	2
SILVER	1	15		2
CHECKS	2	15	5	11
	1	25		
	1	40		4
	90	00		
	1	20	20	
			40	
				1
			2	
				1
			40	
			1	
				1
TOTAL $	9	95		

In receiving items for deposit or collection, this Bank acts only as depositor's collecting agent and assumes no responsibility beyond the exercise of due care. All items are credited subject to final payment in cash or solvent credits. This Bank will not be liable for default or negligence of its duly selected correspondents nor for losses in transit, and each correspondent so selected shall not be liable except for its own negligence.

This Bank or its correspondents may send items, directly or indirectly, to any Bank including the payer, and accept its draft or credit as conditional payment in lieu of cash; it may charge back any item at any time before final payment, whether returned or not, also any item drawn on this Bank not good at close of business on day deposited.

On page 268 are pictures of the front and back of one of the checks Henry deposited. The check, you see, has been indorsed.

Mr. Buck: Now, Henry, you must indorse the two other checks just as you did this one you received from Mrs. Green. Then make out the deposit slip for your money and checks as I showed you the last time, only you must list all the checks separately.

In listing the checks you may, if you wish, write to the left of each amount the name of the bank which appears on it.

The deposit slip that Henry made out looked like the one on page 269. What was the date of the deposit? How much money did Henry deposit in currency and silver? How much did he deposit in checks? How much did he deposit all together?

General Practice 25

Work these examples and problems. Time, 15 minutes.

1.	2.	3.	4.
Subtract:	Divide:	Multiply:	Add:
49,001		$8\frac{2}{3} \times 6\frac{2}{3}$	375
7,284	$35\overline{)64{,}729}$		49
			1476
			293
			84
			759
			647
			293
			852

5.	6.	7.	8.
Add:	Divide:	Multiply:	Find:
$84\frac{1}{3}$	$4\frac{1}{6} \div 1\frac{2}{3}$	74.63	$\frac{2}{3}$ of $9\frac{1}{7}$
$7\frac{3}{5}$		.015	

9. A room is 10 ft. by 14 ft. A rug is 9 ft. by 15 ft. Which is larger? Could you use the rug on the floor of this room?

10. Count out the change, just as a merchant would, if you were to buy some goods from him for $3.71 and offer a ten-dollar bill in payment.

11. Mr. Thompson had a check for $18.37, which he received for some merchandise he sold. He indorsed this check and gave it to the butcher in payment of his meat bill, which was $9.85. Name the coins and bills that Mr. Thompson might have received in change.

12. The athletic department of the Lincoln School has $501.22 on hand. They wish to buy 15 sweaters at $5.50 each and 3 basket balls at $10.75 each. How much money will the athletic department have left if they buy these supplies?

13. When canned peaches are selling at 45¢ a single can or $8.64 a case of 24 cans, how much would be saved by buying a whole case instead of 24 cans, one at a time?

14. At the grocer's, Mrs. Smith exchanged 6 dozen eggs at 35¢ a dozen for sugar at 6¢ a pound. How many pounds of sugar did Mrs. Smith get?

15. Mary received a gift of $15 for Christmas. She thinks she will buy some silk for a new party dress. A piece she wants will cost $3.85 a yard, and she will need $2\frac{1}{2}$ yards. If Mary buys this silk, how much money will she have left for trimming and other things?

Writing Checks and Keeping a Check Book

Henry: Mr. Buck, I need some money to buy a pair of shoes, and you haven't told me how I can write checks and get money out of the bank.

Mr. Buck: Well, Henry, I didn't tell you how to write checks before because I knew you would need to know how soon, and that you would ask me when you wanted to know. Since you are going to write checks, you must have a check book. I will get you one and tell you how to keep it.

This is the way to write a check:

You should number the first check you write 1, the second check 2, the third check 3, and so on, in the order in which the checks are written. This check will be No. 1.

Fill in the date on which the check is written.

You should always make your check payable to some person or firm. For example, you should make this check payable to the Bank of Wisconsin.

Be sure to write in figures after the dollar sign the amount of money for which the check is to be made out.

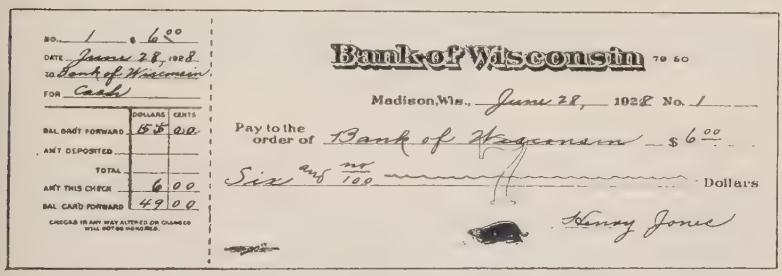
On the line that has the word "dollars" at the end, you should write in words the amount of money for which the check is to be made out.

On the last line, you should write your name just as you wrote it on the signature card when you opened your account here. When you write checks, you should always make the figures and your writing as plain as you can.

You see that each check is fastened to a little piece of paper, on which there is space for a record of your checking account and also space for a record of each check. The little piece of paper is called the **stub.** Every check has a stub. The stub shows the number of the check, the date, the name of the person or firm to whom the check is made out, the purpose for which

the check is written, the amount of money you had before writing the check, the amount of money for which the check is written, and the amount remaining after the amount of the check has been subtracted. Find the words on the stub that tell you all these things.

There is also a space for recording the amount of money deposited. When a deposit has been recorded,


NO. 1 $ 6.00
DATE June 28, 1928
TO Bank of Wisconsin
FOR Cash
DOLLARS CENTS
BAL. BRO'T FORWARD 55 00
AMT DEPOSITED
TOTAL
AMT THIS CHECK 6 00
BAL. CARD FORWARD 49 00
CHECKS IN ANY WAY ALTERED OR CHANGED WILL NOT BE HONORED.
Bank of Wisconsin
70-60
Madison, Wis., June 28, 1928 No. 1
Pay to the order of Bank of Wisconsin $ 6.00
Six and no/100 Dollars
Henry Jones

you can find the total amount of money you have in the bank by finding the sum of the balance brought forward from the last check and the amount deposited.

You must always fill out the stub of a check before you tear out the check. You must do this, you see, in order to have an accurate record of your checking account.

There is another thing that I want to tell you, which you must remember above all other things about a checking account. You must not overdraw your account.

Henry: What does that mean, Mr. Buck?

Mr. Buck: That means that you must never write a check for more money than you have in the bank. It is strictly against the law to overdraw your account;

and if you do overdraw your account, you may get into much trouble. Also, the bank will refuse to honor (that is, to pay) the checks for which you have no money.

Henry: Thank you very much, Mr. Buck, for teaching me how to keep my check book and telling me about overdrawing my account. I will try to keep an accurate record of all my checks, and I promise you I will not overdraw.

Questions about Writing Checks and Keeping a Check Book

1. Why should checks be numbered?
2. Why should your name on a check be signed in the same way you signed your name on the signature card when you opened your bank account?
3. Why is the amount written in figures and also in words?
4. What is a check stub?
5. Of what use is a check stub?
6. What is meant by overdrawing a bank account?
7. Why should a person never overdraw his bank account?

The Importance and Use of Bank Statements

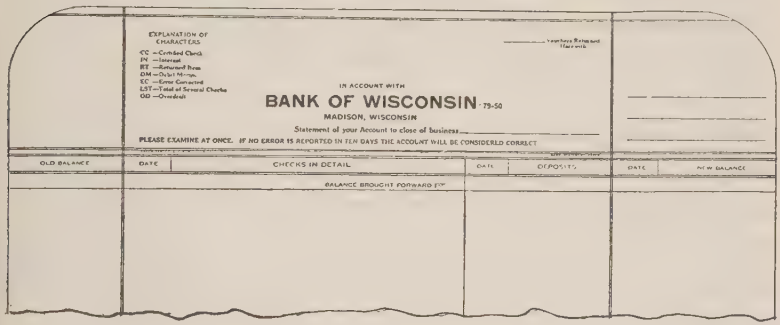
About five weeks after Henry had opened his checking account, he was in the bank making a deposit, when Mr. Buck saw him.

Mr. Buck: Well, Henry, how is the paper and magazine business?

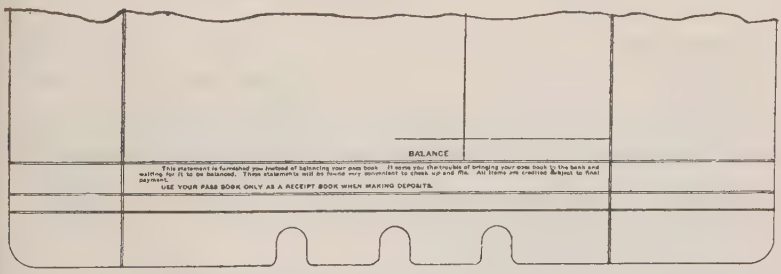
Henry: Fine, thank you, sir, and I am saving nearly all the money I make.

Mr. Buck: Very good. By the way, Henry, have you received your monthly statement from the bank yet?

Henry: No, sir, I haven't. I didn't know anything about a monthly statement.


EXPLANATION OF CHARACTERS
CC —Certified Check
IN —Interest
RT —Returned Item
DM —Debit Memo
EC —Error Corrected
LST—Total of Several Checks
OD —Overdraft
IN ACCOUNT WITH
BANK OF WISCONSIN 79-50
MADISON, WISCONSIN
Statement of your Account to close of business
PLEASE EXAMINE AT ONCE. IF NO ERROR IS REPORTED IN TEN DAYS THE ACCOUNT WILL BE CONSIDERED CORRECT
OLD BALANCE
DATE
CHECKS IN DETAIL
DATE
DEPOSITS
DATE
NEW BALANCE
BALANCE BROUGHT FORWARD

Do not try to read this statement. It is only to show you what a bank statement looks like.


BALANCE
This statement is furnished you instead of balancing your pass book. It saves you the trouble of bringing your pass book to the bank and waiting for it to be balanced. These statements will be found very convenient to check up and file. All items are credited subject to final payment.
USE YOUR PASS BOOK ONLY AS A RECEIPT BOOK WHEN MAKING DEPOSITS.

Mr. Buck: Well, we will go back to the statement clerk and get a statement of your account and ask her to send it to you every month. You see, Henry, you keep a record of all the money you deposit and all the money you draw out when you keep the check stubs. And you know that you leave a deposit slip with the bank so that it may keep a record of your deposits.

When the checks you have written come into the bank, they are stamped "Paid" by the bank and are called **canceled checks,** because they have been paid once and no more money can be collected on them. The bank keeps a very careful record of all the checks it has paid for you. The monthly bank statement is a copy of the bank's record of your deposits and the checks written by you that have been paid. You should get your bank statement with your canceled checks each month and make sure that your own record and the bank's record agree. Sometimes you or the bank might make a mistake in keeping a record of your deposits and checks. So you see that it is important for you to get your monthly bank statement and compare it with the record in your check book.

Practice in Dividing Decimals

Copy and divide the following decimals and whole numbers. Some of the examples come out even, and some of them do not. On those that do not come out even, stop when you get to the third decimal place.

1. Divide 57.28 by 16.
2. Divide 432 by 21.6.
3. Divide 3.175 by 25.
4. Divide 437.5 by .875.
5. Divide 3.2208 by 214.72.
6. Divide 57.6 by 24.
7. Divide 200 by .02.
8. Divide one thousand by one thousandth.
9. Divide 600 by .4.
10. Divide 4293 by 876.

General Practice 26

Work these examples and problems. Time, 15 minutes.

1.	2.	3.	4.
Add:	Subtract:	Subtract:	Multiply:
125	387,064	653.9 − 47.025	47.25
529	68,189		2.06
650			
387			
232			
796			
501			
878			
126			
398			
501			
963			

5.	6.	7.	8.
Subtract:	Multiply:	Divide:	Divide:
$50\frac{2}{3}$	$3\frac{1}{3} \times 5\frac{1}{6}$		
$24\frac{5}{7}$		39)714,756	3)17 ft. 6 in.

9. Which is larger, a 9-foot square or 9 square feet? How much larger?

10. Which is larger, a 12-inch square or 12 square inches? How much larger?

11. How many acres are there in a square field that is 80 rods on each side? How many rods of fence are needed to go around the field?

12. How many acres are there in a rectangular piece

of land, along the railroad right of way, that is 1 rod wide and 160 rods long? How many rods of fence are needed to go around it?

13. Which has the greater area, the field described in problem 12 or the piece of land described in problem 11? Which has the greater perimeter? Did you think it would take more fence to go around a long, narrow rectangular acre than it would to go around 40 acres in the form of a square?

14. The population of Pennsylvania in 1924 was given in an atlas as 8,720,017. The population of Kentucky for the same year was given as 2,416,630. How many more people were there in Pennsylvania than in Kentucky at that date?

Chapter Review

Here is a review of what you have studied in this chapter. Write the numbers 1 to 13 on a sheet of paper. After each number you have written, write the answer to the question that has the same number.

At the end of each question you will see a page number. If you missed any part of the test, turn back to the page number given after that part of the test, where you will find how to answer what you missed. Study what you missed until you are sure you know what to do. Then go back to the chapter review and again try the part you missed. Do this until you do not miss anything or until your teacher tells you to work on something else.

1. Give three good reasons why one should keep a checking account in a bank. (Page 261)

2. What is the difference between a checking account and a savings account? (Page 261)

3. What is a deposit slip? (Page 263)

4. On February 1, 1928, James White paid his house rent by giving Robert Duncan a check for $45 on the Farmers' State Bank of Indianapolis, Indiana. The check was No. 12 in Mr. White's book. Write a copy of the check. (Page 268)

5. What other facts would you need to know in order to fill out completely a stub for the check you have just written? (Page 273)

6. From whose account will the Farmers' State Bank take the money when it pays the check mentioned in problem 4? (Page 273)

7. What does one do when he indorses a check? (Page 268)

8. What does "overdraw a bank account" mean? (Page 273)

9. After writing check No. 26, John Watson had $78 in the bank. He deposited $15 and then wrote check No. 27 for $9. What was the balance carried forward on the stub of check No. 27? (Page 273)

10. How do you tell whether your record and the bank's record of your account agree? (Page 276)

11. What is a signature card, and why should the bank want the signature of a depositor? (Page 262)

12. A man deposited $4 in silver, $25 in bills, and a check for $56. What amount did he write on the line marked "Currency" on the deposit slip? (Page 262)

13. In what way is a check different when it comes back with your monthly statement from what it was when you gave it in payment of a bill? (Page 276)

CHAPTER XV

Percentage

What Per Cent Means

You have learned that fractions having 100 as a denominator, like $\frac{45}{100}$, may be written three ways:

Forty-five hundredths, using words

$\frac{45}{100}$, using a common fraction

.45, using a decimal fraction

But business men do not use any of these ways in naming fractions having 100 as a denominator. Instead, business men say **"per cent,"** which means "hundredths." "Per cent may be written with this sign: %. We usually write % for "per cent."

Think "per cent" when you see %.

"Per cent" means "hundredths." % means "hundredths."

45 per cent, or 45%, means forty-five hundredths, or $\frac{45}{100}$, or .45.

10 per cent, or 10%, means ten hundredths, or $\frac{10}{100}$, or .10.

5 per cent, or 5%, means five hundredths, or $\frac{5}{100}$, or .05.

25 per cent, or 25%, means twenty-five hundredths, or $\frac{25}{100}$, or .25.

50 per cent, or 50%, means fifty hundredths, or $\frac{50}{100}$, or .50.

$12\frac{1}{2}$ per cent, or $12\frac{1}{2}$%, means twelve and one-half hundredths, or $\frac{12\frac{1}{2}}{100}$, or $.12\frac{1}{2}$.

$16\frac{2}{3}$ per cent, or $16\frac{2}{3}\%$, means $\frac{16\frac{2}{3}}{100}$, or $.16\frac{2}{3}$.

$33\frac{1}{3}$ per cent, or $33\frac{1}{3}\%$, means $\frac{33\frac{1}{3}}{100}$, or $.33\frac{1}{3}$.

75 per cent, or 75%, means $\frac{75}{100}$, or .75.

80 per cent, or 80%, means $\frac{80}{100}$, or .80.

"Per cent of" or "% of" means "hundredths times." Think "hundredths times" when you see "per cent of" or "% of."

"6 per cent of" means "6% of" or ".06 times."

"9% of" means "9 per cent of" or ".09 times."

"75% of" means "75 per cent of" or ".75 times."

Aliquot Parts of 100

Sometimes when you want to multiply or divide by some numbers, it is much easier if you know their **aliquot parts.** An aliquot part of a number is an exact fractional part of that number; thus, $33\frac{1}{3}$ is $\frac{1}{3}$ of 100, $66\frac{2}{3}$ is $\frac{2}{3}$ of 100, 75 is $\frac{3}{4}$ of 100, etc. $33\frac{1}{3}$, $66\frac{2}{3}$, and 75 are aliquot parts of 100.

Here is a table of aliquot parts of 100. Learn them and use them.

	1.	2.
(A)	$50 = \frac{1}{2}$ of 100	$30 = \frac{3}{10}$ of 100
(B)	$33\frac{1}{3} = \frac{1}{3}$ of 100	$100 = \frac{4}{4}$ of 100
(C)	$25 = \frac{1}{4}$ of 100	$80 = \frac{4}{5}$ of 100
(D)	$20 = \frac{1}{5}$ of 100	$66\frac{2}{3} = \frac{4}{6}$ of 100
(E)	$16\frac{2}{3} = \frac{1}{6}$ of 100	$50 = \frac{4}{8}$ of 100
(F)	$12\frac{1}{2} = \frac{1}{8}$ of 100	$40 = \frac{4}{10}$ of 100
(G)	$10 = \frac{1}{10}$ of 100	$100 = \frac{5}{5}$ of 100
(H)	$100 = \frac{2}{2}$ of 100	$83\frac{1}{3} = \frac{5}{6}$ of 100
(I)	$66\frac{2}{3} = \frac{2}{3}$ of 100	$62\frac{1}{2} = \frac{5}{8}$ of 100

	1.	2.
(J)	$50 = \frac{2}{4}$ of 100	$50 = \frac{5}{10}$ of 100
(K)	$40 = \frac{2}{5}$ of 100	$100 = \frac{6}{6}$ of 100
(L)	$33\frac{1}{3} = \frac{2}{6}$ of 100	$75 = \frac{6}{8}$ of 100
(M)	$25 = \frac{2}{8}$ of 100	$60 = \frac{6}{10}$ of 100
(N)	$20 = \frac{2}{10}$ of 100	$87\frac{1}{2} = \frac{7}{8}$ of 100
(O)	$100 = \frac{3}{3}$ of 100	$70 = \frac{7}{10}$ of 100
(P)	$75 = \frac{3}{4}$ of 100	$100 = \frac{8}{8}$ of 100
(Q)	$60 = \frac{3}{5}$ of 100	$80 = \frac{8}{10}$ of 100
(R)	$50 = \frac{3}{6}$ of 100	$90 = \frac{9}{10}$ of 100
(S)	$37\frac{1}{2} = \frac{3}{8}$ of 100	$100 = \frac{10}{10}$ of 100

Practice with Aliquot Parts

Write the answers to the following:

	1.	2.
(A)	$\frac{1}{2}$ of 100 is __?__	$\frac{5}{10}$ of 100 is __?__
(B)	$\frac{1}{3}$ of 100 is __?__	$\frac{7}{8}$ of 100 is __?__
(C)	$\frac{1}{4}$ of 100 is __?__	$\frac{9}{10}$ of 100 is __?__
(D)	$\frac{1}{5}$ of 100 is __?__	25 is __?__ of 100
(E)	$\frac{1}{6}$ of 100 is __?__	10 is __?__ of 100
(F)	$\frac{1}{8}$ of 100 is __?__	$12\frac{1}{2}$ is __?__ of 100
(G)	$\frac{1}{10}$ of 100 is __?__	5 is __?__ of 100
(H)	$\frac{2}{3}$ of 100 is __?__	50 is __?__ of 100
(I)	$\frac{2}{4}$ of 100 is __?__	$33\frac{1}{3}$ is __?__ of 100
(J)	$\frac{2}{5}$ of 100 is __?__	$16\frac{2}{3}$ is __?__ of 100
(K)	$\frac{2}{6}$ of 100 is __?__	60 is __?__ of 100
(L)	$\frac{3}{4}$ of 100 is __?__	75 is __?__ of 100
(M)	$\frac{3}{5}$ of 100 is __?__	$37\frac{1}{2}$ is __?__ of 100
(N)	$\frac{3}{8}$ of 100 is __?__	$66\frac{2}{3}$ is __?__ of 100
(O)	$\frac{3}{10}$ of 100 is __?__	$62\frac{1}{2}$ is __?__ of 100
(P)	$\frac{4}{5}$ of 100 is __?__	$87\frac{1}{2}$ is __?__ of 100

	1.	2.
(Q)	$\frac{4}{6}$ of 100 is __?__	20 is __?__ of 100
(R)	$\frac{4}{8}$ of 100 is __?__	40 is __?__ of 100
(S)	$\frac{4}{10}$ of 100 is __?__	$83\frac{1}{3}$ is __?__ of 100
(T)	$\frac{5}{6}$ of 100 is __?__	80 is __?__ of 100
(U)	$\frac{5}{8}$ of 100 is __?__	90 is __?__ of 100

Two Ways of Finding a Per Cent of Any Number

You have learned that any per cent may be written either as a common fraction or as a decimal fraction. You know that "per cent of" or "% of" means "hundredths times." Then, there are two ways in which you can find a per cent of any number.

First Way: Multiply by a common fraction. Find 25% of 184.

You know that 25%, which is another way of writing $\frac{25}{100}$, is the same as $\frac{1}{4}$. Then, "25% of" means "$\frac{1}{4}$ of" or "$\frac{1}{4}$ times" or "$\frac{1}{4}\times$."

$$25\% \text{ of } 184 = \frac{1}{\cancel{4}} \times \cancel{184}^{46} = 46$$

Second Way: Multiply by a decimal. Find 25% of 184.

You know that 25% is the same as .25. You also know that "25% of" is the same as ".25 $\times$."

Then, 25% of 184 is the same as

$$\begin{array}{r} 184 \\ .25 \\ \hline 920 \\ 368 \\ \hline 46.00 \end{array}$$

As you would expect, the answer is the same as when you multiplied by a common fraction.

From now on you should try to decide immediately whether it is quicker, and therefore better, to multiply by a common fraction or to multiply by a decimal.

Here are some per cents that can usually be found more easily by multiplying by common fractions. If you remember the aliquot parts of 100, you will have no trouble remembering these.

$25\% = \frac{1}{4}$	$20\% = \frac{1}{5}$	$83\frac{1}{3}\% = \frac{5}{6}$
$50\% = \frac{1}{2}$	$40\% = \frac{2}{5}$	$62\frac{1}{2}\% = \frac{5}{8}$
$75\% = \frac{3}{4}$	$60\% = \frac{3}{5}$	$87\frac{1}{2}\% = \frac{7}{8}$
$33\frac{1}{3}\% = \frac{1}{3}$	$80\% = \frac{4}{5}$	$10\% = \frac{1}{10}$
$16\frac{2}{3}\% = \frac{1}{6}$	$12\frac{1}{2}\% = \frac{1}{8}$	$30\% = \frac{3}{10}$
$66\frac{2}{3}\% = \frac{2}{3}$	$37\frac{1}{2}\% = \frac{3}{8}$	$70\% = \frac{7}{10}$

Practice in Finding Per Cents of Numbers

Find:

	1.	2.	3.
(A)	90% of 66	55% of 200	3% of 168
(B)	$37\frac{1}{2}\%$ of 160	20% of 650	10% of 146
(C)	$66\frac{2}{3}\%$ of 240	67% of 110	30% of 251
(D)	$12\frac{1}{2}\%$ of 112	$62\frac{1}{2}\%$ of 64	26% of 94
(E)	70% of 700	$83\frac{1}{3}\%$ of 420	80% of 96
(F)	18% of 600	25% of 400	$33\frac{1}{3}\%$ of 45
(G)	29% of 45	93% of 105	53% of 109
(H)	$16\frac{2}{3}\%$ of 350	40% of 800	75% of 120
(I)	38% of 97	$87\frac{1}{2}\%$ of 800	60% of 75
(J)	47% of 85	50% of 1000	17% of 89

Finding Per Cent in School

Mary is in a class that has 40 pupils in it. On a spelling test in which there were fifty words, the results were as follows:

Ten per cent of the class spelled all the words correctly.

Fifteen per cent of the class spelled 36 words correctly.

Twenty per cent of the class spelled 34 words correctly.

Forty per cent of the class spelled 32 words correctly.

Ten per cent of the class spelled 30 words correctly.

Five per cent of the class spelled 28 words correctly.

1. How many children spelled 50 words correctly?
2. How many children spelled 36 words correctly?
3. How many children spelled 34 words correctly?
4. How many children spelled 32 words correctly?
5. How many children spelled 30 words correctly?
6. How many children spelled 28 words correctly?

One week during the winter, when several children were ill, the attendance record of the class for each day in per cents was as follows:

Day	Mon.	Tues.	Wed.	Thurs.	Fri.
Per cent of class present	90	85	90	95	80

7. How many children were present on Monday?
8. How many children were present on Tuesday?

9. How many children were present on Wednesday?
10. How many children were present on Thursday?
11. How many children were present on Friday?

Practice in Multiplying Denominate Numbers

Copy and multiply:

1. 2 ft. 3 in. by 7
2. 4 lb. 5 oz. by 8
3. 6 min. 45 sec. by 5
4. 2 gal. 3 qt. by 3
5. 2 sq. ft. 120 sq. in. by 4
6. 8 bu. 3 pk. by 14
7. 2 mo. 6 da. by 5 (Use 30 days to 1 month.)
8. 5 hr. 45 min. by 6
9. Mr. Thompson has a square garden, each side of which is 132 ft. 4 in. long. How much fencing will Mr. Thompson need to inclose his garden?
10. Mr. Brown's wheat crop averaged 28 bu. 3 pk. per acre last year. If it does the same this year and Mr. Brown sows 160 acres, how many bushels of wheat will Mr. Brown raise?

General Practice 27

Work these examples and problems. Time, 15 minutes.

1.	2.	3.	4.
Divide:	Multiply:	Subtract:	Multiply:
$7\frac{2}{3} \div 5\frac{1}{6}$	47.2 120	$19\frac{1}{3}$ $8\frac{5}{7}$	$9\frac{2}{7}$ by $5\frac{1}{3}$

5.	6.	7.	8.
Add:	Divide to	Add:	Subtract:
37.2	3 places:	$5\frac{1}{2}$	3.0708
1.6		$\frac{3}{4}$	.9819
5.29	$125\overline{)83}$	$17\frac{2}{3}$	
38.		$\frac{5}{6}$	
5.46			
210.			
.89			

9. Divide 63,360 by 12.

10. When lemons are selling at 3 for a dime, how many lemons can you buy for a half dollar?

11. If 864 trees are set in 24 equal rows, how many trees will there be in each row?

12. From Washington, D. C., to Baltimore, Md., the distance is 40 miles, while Harrisburg, Pa., is 83 miles farther on. If you were traveling from Washington to Harrisburg, what part of your journey would have been completed by the time you reached Baltimore? Express this part as a decimal fraction.

13. Mr. Lane built a barn that cost $1295. He paid $595 when the barn was completed and agreed to pay $50 a month until the remainder had been paid. How long will it take him to pay for the barn?

14. Mr. Lee is going to have a new concrete walk from his house to the front street. He wants to have it made 3 ft. 6 in. wide, and it will be 40 ft. long. The contractor told Mr. Lee that it would cost 18¢ a square foot. What will it cost Mr. Lee to have the concrete walk made?

15. The total deposits made by the Music Shop at the Commonwealth Bank and Trust Company were $988.20 for a week of six days. What was the average daily deposit?

A Junior High School Baseball League

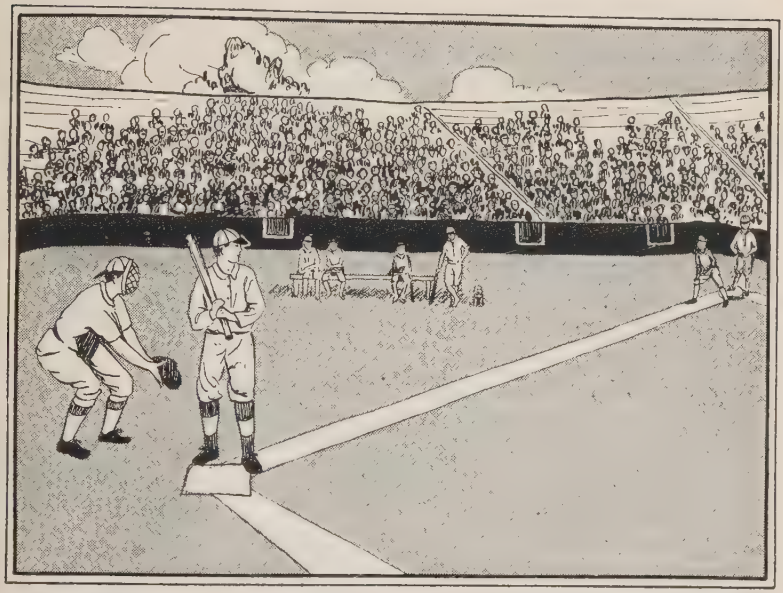
The Longfellow Junior High School has a baseball league in which six teams are entered. The names of the teams, the number of games played, the per cent of games won, tied, and lost are as follows:

Team	Games Played	Per Cent of Games Won	Per Cent of Games Tied	Per Cent of Games Lost
Reds	10	60	20	20
Grays	10	50	20	30
Golds	10	50	10	40
Blues	10	40	10	50
Whites	10	30	0	70
Blacks	10	30	20	50

1. How many games did the Reds win? Tie? Lose?
2. How many games did the Grays win? Tie? Lose?
3. How many games did the Golds win? Tie? Lose?
4. How many games did the Blues win? Tie? Lose?
5. How many games did the Whites win? Tie? Lose?
6. How many games did the Blacks win? Tie? Lose?

Attendance at the Championship Game

1. At the game for the championship of the city, the Longfellow Junior High School played the Lincoln



Junior High School. The Longfellow Junior High School has 1180 pupils enrolled. If 70% of them attended the game, how many pupils were there?

2. The Lincoln Junior High School has 1250 pupils enrolled, but only 60% of them went to the big game. How many pupils were at the game from the Lincoln School?

3. Which school had more pupils at the game? How many more?

Buying an Automobile Tire

Jack's father needed a tire for the automobile. He of course wanted to buy it as cheaply as possible and still get a good tire. He noticed that six of the tire stores had special sales on; so he and Jack went to these

six stores to see what a tire would cost. At each store the regular price was listed and a certain per cent off was offered. The stores visited, the regular prices, and the per cents off were as follows:

Store	Regular Price	Per Cent Off
Supreme Tire Company	$36.60	$16\frac{2}{3}\%$
Ideal Tire Store	34.00	10%
Excelsior Tire Company	36.00	30%
Rush Auto Supply House	37.50	$33\frac{1}{3}\%$
Henry Brothers Company	32.00	$12\frac{1}{2}\%$
Auto Accessory Company	36.50	20%

1. What would the tire cost at the Supreme Tire Company store?
2. What would the tire cost at the Ideal Tire Store?
3. What would the tire cost at the Excelsior Tire Company store?
4. What would the tire cost at the Rush Auto Supply House?
5. What would the tire cost at the Henry Brothers Company store?
6. What would the tire cost at the Auto Accessory Company store?
7. If one tire was about as good as another, at which store do you think Jack's father bought his tire? Why?

Practice in Dividing Denominate Numbers

Copy and divide:

1. 17 lb. 4 oz. by 3
2. 19 ft. 3 in. by 7

3. 34 min. 16 sec. by 8
4. 2375 bu. 1 pk. by 3
5. 204 gal. 3 qt. by 9
6. 15 hr. 24 min. by 7
7. 8 T. 1760 lb. by 3
8. 3 sq. ft. 68 sq. in. by 5
9. 7 A. 136 sq. rd. by 5
10. 41 ft. 8 in. by 6

General Practice 28

Work these examples and problems. Time, 15 minutes.

1.	2.	3.	4.
Multiply:	Add:	Divide:	Subtract:
5927	593		380,107
19	64	$27\overline{)64{,}378}$	2,964
	7125		
	378		
	129		
	34		
	1673		
	298		
	147		

5.	6.	7.	8.
Multiply:	Multiply:	Divide:	Add:
$5\frac{2}{3} \times 6\frac{1}{2}$	$7.38 \times .5$		$5\frac{1}{2}$
		$82\overline{)37{,}649}$	$17\frac{2}{3}$
			$6\frac{1}{4}$

9. The rainfall in inches each month one year in Indiana was: January, 2.26; February, 2.85; March, 3.05; April, 3.75; May, 2.89; June, 2.93; July, 3.30; August, 5.16; September, 7.17; October, 4.32; November, 2.10; December, 1.96. What was the total rainfall for the year?

10. Mrs. Smith has a new fur coat. While waiting for a train at the depot, Mrs. Smith got weighed on the scale. With her coat on, she weighed 141 lb. 5 oz. With her coat off, she weighed 129 lb. 11 oz. How much did Mrs. Smith's fur coat weigh?

11. Mr. Sawyer raised 1163 bu. 1 pk. of oats on 47 acres of land. What was the average yield per acre?

12. When candy is 75¢ a pound, how many ounces should you get for 25¢?

13. When lemons are selling at 6 for a quarter, what will a dozen and a half lemons cost?

14. Grace's mother wants to make some towels. If she uses 2 ft. 6 in. of material for a towel, how much toweling must she buy to make a half dozen towels?

15. In flying from New York to Paris, Colonel Charles Lindbergh flew 3610 miles in 33 hours, 30 minutes. How many miles per hour did he average? (Work to the second decimal place.)

Proving Work in Percentage

Since finding per cents of numbers is just multiplying, to prove your work in **percentage** — that is, your work with per cents — you can exchange the multiplicand and multiplier and multiply again, just as you have been doing in proving multiplication of whole

numbers. Another way to prove work in percentage is to find the answer in two ways.

Find these percentages and then prove your work. You may decide for yourself which method you will use in proving your work.

	1.	2.	3.
(A)	5% of 50	9% of 40	27% of 45
(B)	61% of 65	28% of 89	75% of 60
(C)	43% of 98	40% of 80	14% of 73

Adding and Subtracting Per Cents

How many hundredths are there in any whole? How many per cent are there in any whole? Just as there are $\frac{100}{100}$ in any whole amount, so 100% of anything is the whole of it because % means "hundredths" and there are $\frac{100}{100}$ in any whole.

1. In the Lee Elementary and Junior High School there are 900 pupils. The first grade has 15% of the pupils in the school in it. The second grade has 14% of the pupils in the school in it. The third grade has 15% of the pupils in the school in it. The eighth grade has 8% of the pupils in the school in it. The ninth grade has 8% of the pupils in the school in it. Each of the fourth, fifth, sixth, and seventh grades has the same per cent of the total school enrollment. Find how many pupils there are in each of the nine grades.

2. A father decided to divide $12,000 among two sons and two daughters. He gave 30% to each of his daughters. The remainder he divided equally between his sons. How much money did each child receive?

3. In an arithmetic class of forty pupils, the test results were as follows:

25% of the class made 90 or more.
45% of the class made between 80 and 90.
The rest of the class made less than 80.

How many pupils were in each of the three groups?

Working with Per Cents above 100%

What is $\frac{1}{2}$ of 40?	What is $\frac{2}{2}$ of 40?
What is 50% of 40?	What is 100% of 40?
What is $\frac{3}{2}$ of 40?	What is $\frac{5}{2}$ of 40?
What is 150% of 40?	What is 250% of 40?
What is $\frac{55}{100}$ of 100?	What is 55% of 100?
What is $\frac{100}{100}$ of 100?	What is 100% of 100?
What is $\frac{200}{100}$ of 100?	What is 200% of 100?

Remember that "per cent" means "hundredths"; and just as you may have an improper fraction bigger than 1 so you may have more than 100 per cent.

Also remember:

$50\% = \frac{1}{2}$	$75\% = \frac{3}{4}$	$12\frac{1}{2}\% = \frac{1}{8}$	$83\frac{1}{3}\% = \frac{5}{6}$
$25\% = \frac{1}{4}$	$66\frac{2}{3}\% = \frac{2}{3}$	$37\frac{1}{2}\% = \frac{3}{8}$	$87\frac{1}{2}\% = \frac{7}{8}$
$33\frac{1}{3}\% = \frac{1}{3}$	$16\frac{2}{3}\% = \frac{1}{6}$	$62\frac{1}{2}\% = \frac{5}{8}$	$100\% = 1$

Find:

	1.	2.	3.
(A)	125% of 80	$1\frac{1}{4} \times 80$	1.25×80
(B)	150% of 60	$1\frac{1}{2} \times 60$	1.50×60
(C)	175% of 100	$1\frac{3}{4} \times 100$	1.75×100
(D)	140% of 95	$1\frac{2}{5} \times 95$	1.40×95
(E)	120% of 40	$1\frac{1}{5} \times 40$	1.20×40

	1.	2.	3.
(F)	105% of 110	$1\frac{1}{20} \times 110$	1.05×110
(G)	$112\frac{1}{2}\%$ of 48	$1\frac{1}{8} \times 48$	1.125×48
(H)	$133\frac{1}{3}\%$ of 66	$1\frac{1}{3} \times 66$	$1.33\frac{1}{3} \times 66$
(I)	$137\frac{1}{2}\%$ of 56	$1\frac{3}{8} \times 56$	1.375×56
(J)	$116\frac{2}{3}\%$ of 42	$1\frac{1}{6} \times 42$	$1.16\frac{2}{3} \times 42$

Finding What Per Cent One Number Is of Another Number

John has 4 pencils, and George has 2 pencils. John has how many times as many pencils as George? $2 \times ? = 4$. What per cent are 2 pencils of 4 pencils? What per cent is 2 of 4? What is 50% of 4? You see that 2 pencils are $\frac{1}{2}$, or 50%, of 4 pencils, and you see that 2 is $\frac{1}{2}$, or 50%, of 4. But how would you work it out to show it?

This is the way:

Think: "What fractional part are 2 pencils of 4 pencils? 2 pencils are $\frac{2}{4}$ of 4 pencils. Then, since $\frac{2}{4}$ of anything is $\frac{1}{2}$ or 50% of it, 2 pencils are $\frac{1}{2}$, or 50%, of 4 pencils."

That is the way to work it if we use common fractions. But you have learned that sometimes it is much more convenient to use decimals than common fractions. So, using decimals instead of common fractions, this would be the way to find what per cent 2 pencils are of 4 pencils.

$$\begin{array}{r} .50 \text{ or } 50\% \\ 4\overline{)2.00} \end{array}$$

Two pencils are what fractional part of 4 pencils? Two pencils are $\frac{2}{4}$ of 4 pencils. But $\frac{2}{4}$ may be changed to a decimal fraction showing

hundredths. $\frac{2}{4}$ is the same as the decimal fraction .50. Then, writing .50 as a per cent, you have 50%. Two pencils are 50% of 4 pencils.

Easy Practice in Finding What Per Cent One Number Is of Another Number

Here are some easy examples. Work without pencil. Think, "8 is $\frac{8}{16}$ of 16, or 8 is $\frac{1}{2}$ of 16, or 8 is 50% of 16."

	1.	2.
(A)	8 is what per cent of 16?	6 is what per cent of 48?
(B)	3 is what per cent of 9?	60 is what per cent of 80?
(C)	2 is what per cent of 12?	27 is what per cent of 45?
(D)	5 is what per cent of 20?	50 is what per cent of 60?
(E)	10 is what per cent of 50?	65 is what per cent of 100?

Harder Practice in Finding What Per Cent One Number Is of Another Number

Use pencil. The first example is worked for you.

1. What per cent of 152 is 38?

$$\frac{38}{152} = \frac{19}{76} = \frac{1}{4} = .25 = 25\%$$

.25 or 25%

or

$$\begin{array}{r} 152\overline{)38.00} \\ 30\,4 \\ \hline 7\,60 \\ 7\,60 \\ \hline \end{array}$$

2. 256 is what per cent of 512?
3. What per cent is 57 of 76?

4. What per cent is 28 of 140?
5. What per cent is 72 of 288?
6. 36 is what per cent of 72?
7. 44 is what per cent of 176?
8. 56 is what per cent of 280?
9. 55 is what per cent of 220?
10. 96 is what per cent of 128?

General Practice 29

Work these examples and problems. Time, 15 minutes.

1.	2.	3.	4.
Multiply:	Subtract:	Add:	Divide:
\$5.32	$37\frac{1}{3}$	3	
15	$15\frac{3}{5}$	593	$3.7\overline{)3.182}$
		65	
		298	
		415	
		4732	
		675	
		93	
		812	
		47	

5.	6.	7.	8.
Divide:	Multiply:	Change	Subtract:
	537	7 lb. 13 oz.	61,005
$7\overline{)83}$ ft. 5 in.	630	to ounces.	2,908

9. Henry joined a Christmas Savings Club at the bank on January 1 and agreed to deposit 75¢ each

week for 50 weeks. If he does as he agreed, how much will all of Henry's deposits amount to? If the bank gives Henry 56¢ for the use of the money he deposits, how much will Henry have in his Christmas savings account at the end of 50 weeks?

10. How much does Arthur's father have to pay the railroad company for shipping a carload of hogs to market if the hogs weigh 14,325 pounds and if the shipping rate is 9¢ a hundredweight?

11. Harry picked 15 quarts of raspberries, which he sold for 28¢ a quart; and James picked 17 quarts of blackberries, which he sold for 25¢ a quart. Which boy received more money, and how much more did he receive?

12. Charles broke 5 spokes in his bicycle wheel. The repair man charged him 25¢ each to put in new ones. Charles gave the man two $1 bills to pay for them. How much change should Charles have received?

13. Last Thursday Mary's father worked in a factory from 8 A.M. to 12 M.; from 1 P.M. to 5 P.M., and from 7 P.M. to 9:30 P.M. If Mary's father gets 60¢ an hour for regular time during the day and is allowed time and one-half for the time he works in the evening, how much did Mary's father earn that day?

14. The heights of the boys on the school basket-ball team are as follows: 5 ft. 7 in., 5 ft. 10 in., 5 ft. $4\frac{1}{2}$ in., 5 ft. 9 in., and 5 ft. $9\frac{1}{2}$ in. What is their average height?

15. Jane wishes to write a check to pay for 5 music lessons at $1.25 each and 3 pieces of music at 75¢ each. For how much should Jane make out the check?

Chapter Review

Here is a review of what you have studied in this chapter. Write the numbers 1 to 16 on a sheet of paper. After each number you have written, write the answer to the question that has the same number.

At the end of each question you will see a page number. If you missed any part of the test, turn back to the page number given after that part of the test, where you will find how to answer what you missed. Study what you missed until you are sure you know what to do. Then go back to the chapter review and again try the part you missed. Do this until you do not miss anything or until your teacher tells you to work on something else.

1. What is the sign that means per cent? (Page 280)

2. In how many ways can you find 25% of 48? (Page 283)

3. Write "35 per cent" in three ways. (Page 280)

4. What is an aliquot part? (Page 281)

5. How do you prove an example in percentage? (Page 292)

6. What common fraction is equal to $87\frac{1}{2}\%$? (Page 284)

7. Find 120% of 60. (Page 294)

8. What does "per cent" mean? (Page 280)

9. What decimal fraction is the same as 75%? (Page 281)

10. What common fraction is equal to 75%? (Page 284)

11. Mr. Stevens set out an orchard of peach trees.

$94\frac{1}{2}\%$ of the trees grew. What per cent of the trees died? (Page 293)

12. How many hundredths are there in any whole amount? (Page 293)

13. How many per cent are there in any whole amount? (Page 293)

14. Dick Brown received a \$5 bill for his birthday. He spent $\frac{1}{2}$ of the money for a flashlight and $\frac{1}{5}$ for a pocket knife, and he put the rest in his savings bank. What per cent of the money did he save? (Page 295)

15. How do you find what per cent one number is of another number? (Page 296)

16. What per cent of 45 is 30? (Page 296)

PART FOUR

CHAPTER XVI

A Review of What You Have Studied in Sixth-Grade Arithmetic

Before beginning the next part of this book, you need to review the important things you have studied in Part Three. In this chapter are some review exercises that contain many of the important facts you have studied. Try to work all the examples and problems and answer all the questions without any errors. If there are some questions you cannot answer or if there are some examples or problems you cannot work, get your teacher to give you some work that will keep you from making the same mistakes again.

Practice Test in Addition

Add, and write the sums on a folded paper. Time, 7 minutes.

	1.	2.	3.	4.	5.	6.
(A)						2
		6				1
	5	5				9
	7	8	57	69	54	7
	9	7	41	27	47	8

	1.	2.	3.	4.	5.	6.
(B)		40		67	29	
	512	24	316	8	83	436
	38	23	477	15	95	295
(C)			42	37	87	
	40	28	11	5	95	
	31	15	43	19	64	315
	2	37	1	2	77	241
	64	18	2	17	96	102
(D)						52,175
					4273	46,339
	407	591	179	694	6548	8,412
	215	172	285	387	1723	732
	136	190	367	596	948	65,934

Practice Test in Subtraction

Subtract, and write the differences on a folded paper. Time, 7 minutes.

	1.	2.	3.	4.	5.	6.
(A)	29	75	93	69	92	79
	17	30	12	29	66	42
(B)	166	156	374	914	801	106
	99	67	157	361	580	31
(C)	602	501	1423	458	437	1517
	260	244	789	357	367	996

	1.	2.	3.	4.	5.	6.
(D)	1270	1184	7401	5834	9000	2942
	967	740	2003	3035	8890	2044
(E)	5952	901,358	160,675	693,787	791,264	714,122
	4647	555,889	113,788	418,098	124,567	325,525

Practice Test in Multiplication

Multiply, and write the products on a folded paper. Time, 7 minutes.

	1.	2.	3.	4.	5.	6.
(A)	73	432	514	745	618	759
	45	68	231	320	402	300
(B)	8143	7359	4297	5239	6283	7593
	62	80	306	470	500	165
(C)	21,643	83,479	29,653	92,030	75,291	63,142
	52	70	420	406	275	400

Practice Test in Long Division

Copy, and divide by long division. Time, 7 minutes.

	1.	2.	3.
(A)	$83\overline{)5876}$	$39\overline{)1131}$	$56\overline{)4480}$
(B)	$67\overline{)1206}$	$23\overline{)1817}$	$45\overline{)2430}$
(C)	$913\overline{)657,360}$	$144\overline{)73,008}$	$160\overline{)45,600}$

General Review

Here are some questions about what you have been studying in arithmetic. Write the numbers 1 to 27 on your paper and then write the answers after the numbers of the questions.

1. How many decimal places do you point off in the product in multiplying decimals?

2. Where would you put the decimal point in this example?

$$\begin{array}{r} 4.52 \\ 1.9 \\ \hline 4068 \\ 452 \\ \hline 8588 \end{array}$$

Copy the product and put the decimal point in the correct place.

3. What is the easiest and quickest way to multiply a decimal by 10, 100, or 1000?

4. In dividing decimals, where should you put the decimal point in the quotient?

5. How can a common fraction be changed to a decimal?

6. Multiply 8 lb. 7 oz. by 5.

7. Divide 18 ft. 1 in. by 7.

8. What is meant by opening a checking account in a bank?

9. What is the difference between a check and a check stub?

10. What is meant by indorsing a check?

11. Name the important parts of a check.

12. What is a check book?

13. What is a deposit?

14. What is a bank statement?

15. What is a pass book?

16. How may checks be listed on a deposit slip?

17. What is a canceled check?

18. What is a signature card?

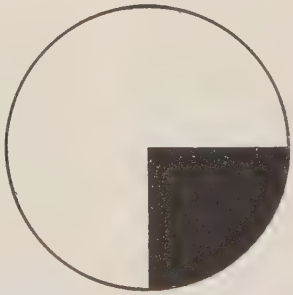
19. What is the purpose of a signature card?

20. Why should a person never overdraw his bank account?

21. What is meant by an aliquot part?

22. What aliquot part of 100 is 25? $66\frac{2}{3}$? $87\frac{1}{2}$?

23. What per cent of this circle is shaded?



24. Write as decimal fractions: 5%, 18%, 75%, 95%.

25. Tell how to find a per cent of any number.

26. Tell how to find what per cent one number is of another number.

27. What does "per cent" mean?

Practice Test on Common Fractions

Copy and work these examples:

	1.	2.	3.	4.
	Add:	Multiply:	Subtract:	Add:
(A)	$\frac{2}{3}$ $\frac{3}{4}$	$\frac{3}{8} \times \frac{2}{15}$	$\frac{1\,1}{1\,2}$ $\frac{3}{4}$	$5\frac{1}{2}$ $6\frac{2}{3}$ $18\frac{1}{4}$

	1.	2.	3.	4.
	Divide:	Add:	Multiply:	Subtract:
(B)	$\frac{5}{8} \div \frac{5}{12}$	$\frac{5}{8}$ $\frac{1}{3}$ $\frac{1}{4}$	$\frac{3}{5} \times \frac{7}{8} \times \frac{5}{12} \times 4$	7 $\frac{5}{9}$
	Divide:	Subtract:	Add:	Find:
(C)	$\frac{9}{16} \div 5$	1 $\frac{11}{12}$	$\frac{2}{3}$ $\frac{2}{5}$	$\frac{3}{8}$ of $6\frac{2}{3}$
	Divide:	Multiply:	Subtract:	Add:
(D)	$8 \div \frac{4}{5}$	$12\frac{1}{2} \times \frac{4}{5}$	$47\frac{3}{4}$ $23\frac{5}{6}$	$\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{6}$
	Divide:	Subtract:	Multiply:	Divide:
(E)	$4\frac{2}{3} \div 6$	$29\frac{1}{3}$ $18\frac{7}{12}$	$1\frac{1}{2} \times 2\frac{1}{4} \times 3$	$3\frac{3}{4} \div 1\frac{1}{2}$

Practice Test in Multiplying Decimals

Copy and multiply:

	1.	2.	3.	4.
(A)	47 1.2	.52 .43	.69 .38	.643 29
(B)	.87 64	5.7 2.0	68 .47	.93 .018

	1.	2.	3.	4.
(C)	.608 × 4.2	.47 × .9	4.2 × 6.4	432 × .016
(D)	9.7 × .24	.735 × .46	5.9 × .017	.923 × .416

Practice Test in Dividing Decimals

Copy and divide:

	1.	2.	3.	4.
(A)	$24\overline{)9.6}$	$32\overline{)1472}$	$.87\overline{)36.54}$	$2.4\overline{)1.368}$
(B)	$84\overline{)3.024}$	$87\overline{)18.27}$	$5.9\overline{)3717}$	$7.5\overline{).048}$
(C)	$5.6\overline{)15.12}$	$.014\overline{)4.48}$	$9.6\overline{)56.64}$	$.04\overline{)217}$
(D)	$.25\overline{).004}$	$.007\overline{)35}$	$3.2\overline{)147.2}$	$.215\overline{)130.075}$

Practice Test in Multiplying Denominate Numbers

Copy and multiply:

	1.	2.	3.
(A)	5 lb. 7 oz. × 8	6 ft. 3 in. × 8	7 qt. 1 pt. × 6
(B)	5 gal. 3 qt. × 4	5 bu. 3 pk. × 7	8 lb. 4 oz. × 8
(C)	5 ft. 7 in. × 6	4 qt. 1 pt. × 5	37 min. 15 sec. × 4
(D)	6 bu. 1 pk. × 7	9 gal. 1 qt. × 5	29 min. 18 sec. × 7

Problems

1. Without using a pencil, tell which is more, 2.95×4.87 or 2.01×8.12. Why?

2. Is the rate the same in selling 100 stamped envelopes for $2.45 as in selling 1000 stamped envelopes for $23.80? If not, which is the cheaper rate, and how much cheaper per envelope?

3. If 24 geographies cost $32.40, what is the cost of 1 geography?

4. In a spelling test containing 20 words, Mary spelled 95% of them correctly. How many words did Mary spell correctly?

5. The Washington School baseball team won 5 games out of 8. What per cent of its games did the Washington School team win?

6. A hotel paid $18.00 for some sugar at 6 cents a pound. How many pounds of sugar did it get?

7. Tom's father bought 12.5 tons of coal at $8.75 a ton. What did the coal cost?

8. The distance from Milwaukee to Chicago is 79.4 miles. A passenger train makes the trip in 2 hours. What is the average number of miles per hour that the train runs?

9. If a freight train takes 5 hours to go from Chicago to Milwaukee, a distance of 79.4 miles, how many miles per hour does it average?

10. George's uncle sold 35 bushels of oats for $18.55. What was the average price per bushel?

11. A farmer bought 15 cows for $941.25. What was the average price per cow?

12. A farmer raised 2100 bushels of wheat on 80 acres of land. What was the average yield per acre?

13. Sarah paid \$5.76 for 32 yards of calico. How much did she pay for a yard?

14. At 7 cents each, how many penholders can be bought for \$35?

15. If 36 exercise books cost \$18.72, what is the cost of 1 book?

16. During April Mary's mother paid \$6 for milk at 12 cents a quart. How many quarts of milk did Mary's mother buy?

17. A merchant paid \$24 for some flashlights at 75 cents each. How many flashlights did he buy?

18. A freight train contains 18 cars and carries a total weight of 585 tons. What is the average weight per car?

Practice Test in Dividing Denominate Numbers

Copy and divide:

	1.	2.	3.
(A)	4)17 ft. 8 in.	3)12 bu. 3 pk.	6)57 lb. 0 oz.
(B)	3)27 min. 30 sec.	3)5 yr. 3 mo.	5)25 ft. 10 in.
(C)	6)75 bu. 0 pk.	7)18 wk. 0 da.	5)7 wk. 1 da.
(D)	6)52 min. 30 sec.	4)6 yr. 0 mo.	7)83 lb. 9 oz.

General Practice 30

Work these examples and problems. Time, 15 minutes.

1.	2.	3.	4.
Multiply: 4.75 .015	Change to a decimal: $\frac{47}{64}$	Divide: $.08\overline{)32}$	Multiply: 5 lb. 13 oz. 7
5.	**6.**	**7.**	**8.**
Divide: $9\overline{)16 \text{ ft. } 6 \text{ in.}}$	Multiply: $.0573 \times 100$	Subtract: 4.82 .004	Divide: $4293 \div 1000$
9.	**10.**	**11.**	**12.**
Divide to 3 decimal places: $12\overline{)4.6}$	Divide: $59.6 \div 10$	Divide: $3.46\overline{).05882}$	Find: 35% of \$420

13. Walnut Hall, a White Leghorn hen, laid 292 eggs in one year. If the average price of eggs that year was 40¢ a dozen, what was the market value of her eggs?

14. Mr. Gordon raised 3956 bu. 1 pk. of corn on 75 acres of land. What was the average yield per acre?

15. A national league baseball team won 54 games out of 81 that it played. What per cent of its games did it win?

CHAPTER XVII

Some Everyday Uses of Percentage

Discounts at Special Sales

As you know, stores often have special sales, when articles are sold for less than their usual prices. During one of these sales, a store had this sign in the window:

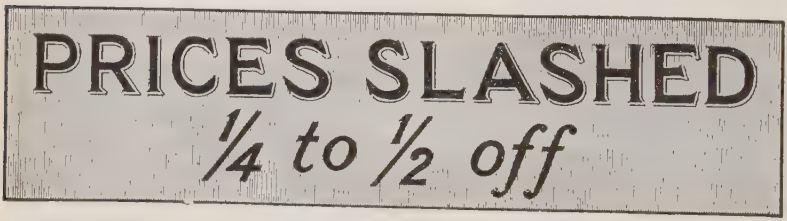
Special New Year's Sale
PRICES CUT
15% OFF

At this sale what per cent would be taken off the price of a regular $50 coat? How much would be taken off the price of a regular $50 coat? How much would the coat cost? The amount taken off the regular price of an article is called a **discount.**

1. Here is a list of articles with their regular prices. Find how much each article would cost in this sale.

Article	Price	Article	Price
Dress	$25.00	Blankets (pair)	$10.00
Hat	8.00	Bedspread	7.50
Scarf	3.50	Sewing cabinet	14.00
Raincoat	12.50	Magazine holder	4.00
Umbrella	7.50	Waffle iron	12.00
Shoes (pair)	8.50	Mirror	9.00
Tie	1.50	Floor lamp	15.00
Gloves (pair)	3.00	Pillow	3.50
Belt	2.50	Candlesticks (pair)	6.00
Cuff links	5.00	Chair	15.00

2. Another store had this sign in its window:



From the above sign, what "per cent off" would you expect? What per cent does $\frac{1}{4}$ equal? $\frac{1}{2}$?

Here is a list of articles with the regular price and the sale price. Find the per cent that was actually "given off" on each article and tell whether or not the discount was as advertised.

Make a form like the one below and fill in the column headed "Per Cent Off." Do you remember how to find what per cent one number is of another number?

Article	Regular Price	Sale Price	Per Cent Off
Lawn mower	$10.00	$6.75	
Garden hose	6.00	4.50	
Lawn sprinkler	2.00	1.25	
Spading fork	1.65	1.10	
Hoe	1.50	.90	
Electric iron	6.50	4.00	
Desk light	3.50	2.00	
Household scales	2.75	2.35	
Floor mop	2.50	2.00	
Kitchen stool	2.00	1.65	
Fishing rod	6.00	5.60	
Flashlight	1.75	1.50	
Camp cooking set	3.00	2.60	
Ax	2.00	1.80	
Pack sack	2.75	2.25	
Tennis shoes	4.50	4.00	
Tennis racket	8.00	6.50	
Roller skates	4.00	3.25	
Scissors	1.75	1.30	
Flower bowl	1.25	.95	

Cash Discount

Mr. and Mrs. White went to a music store to buy a piano. After looking at several pianos and playing

on each one, they finally decided that they wanted a second-hand baby grand piano, priced at $900. The salesman told them they would get 10% off if they paid cash. In other words, the salesman meant that they would save 10% of $900, or $90, by paying for the piano at the time they bought it. So Mr. and Mrs. White paid cash and saved $90. How much did they pay for the piano?

A discount that is given because the people who buy an article pay cash for it is called a **cash discount.** A great many merchants pay cash for the goods they buy and thus get a cash discount. Some merchants even borrow money in order to be able to get the discount.

Here is a list of furniture with the per cent of discount that would be allowed for cash payment. Find how much the discount would be on each item and then find how much each would cost after it had been discounted. Make a form like this and write the answers in the last two columns.

Article	Price	Discount Allowed for Cash	Amount of Discount	Price after Discount Is Subtracted
Chiffonier	$85.00	5%		
Stove	52.50	10%		
Living-room set	538.00	15%		
Rug	135.50	20%		
Piano	950.00	25%		
Table	42.50	15%		
Kitchen cabinet	135.00	10%		
Refrigerator	225.00	20%		
Dining-room set	386.00	5%		
Bedroom set	467.50	25%		

Problems

1. The number of games won and lost by each of the baseball teams in the American League during the season of 1926 was as follows:

Team	Games Won	Games Lost	Per Cent Won
New York	91	63	
Cleveland	88	66	
Philadelphia	83	67	
Washington	81	69	
Chicago	81	72	
Detroit	79	75	
St. Louis	62	92	
Boston	46	107	

Find the number of games played by each club. Find the per cent of games won that were played by each club. How could you find the per cent of games lost by each club?

2. The Jefferson Elementary School had 766 pupils enrolled in it during the school year 1927–1928. The enrollment by grades was as shown here. Find what per cent of the whole school was enrolled in each grade. Work to the third decimal place and express your answer as a per cent. Thus, .273 = 27.3%.

Grade	Enrolled	Per Cent
1	148	
2	136	
3	130	
4	129	
5	117	
6	106	

Practice in Adding Decimals

Add these decimals:

	1.	2.	3.	4.
(A)	5.4	3.8	6.34	5.7
	6.25	.9	.75	.08
	35.	4.2	.2	.967
	7.21	.5	.04	1.2
(B)		6.0	3.83	
	3.75	2.193	247.	4.32
	.004	53.	84.3	16.
	.5	7.89	.497	.375

Copy in columns and add:

5. 5.2, 3.78, .0604
6. 381, 6.15, 7.9
7. 25, 643, .2, 8.34
8. 5.297, .06, 3.8
9. 2.2, 8.37, 200.047

Practice in Subtracting Decimals

Subtract these decimals:

	1.	2.	3.	4.
(A)	35.3	14.103	80.558	8.76
	1.353	3.205	78.6	2.509
(B)	1004.5	542.	64.77	137.67
	289.6	343.76	40.08	85.3

Trade Discount

Here is a bill, or invoice, from Showers Brothers Company to Dean Brothers for a shipment of furniture.

Bloomington, Indiana, Oct. 28, 1928

Dean Brothers
Chicago, Illinois

Bought of

SHOWERS BROS. CO.

Oct. 16	12 Breakfast Sets	@$22.50	$270	00		
Oct. 16	10 Writing Desks	@ 30.00	300	00		
Oct. 16	8 Cedar Chests	@ 28.00	224	00		
Oct. 16	16 Chairs	@ 42.00	672	00		
					$1466	00
		Less 20%			293	20
					$1172	80

The Showers Brothers Company is a manufacturing firm, and the Dean Brothers are a wholesale company. A **manufacturing firm** is a company that makes, or manufactures, things and sells them to both wholesale companies and retail companies. A **wholesale company** is a company that buys from the manufacturing firm in large quantities and sells to retail companies in smaller quantities. A **retail company** is a company that sells things to the people who actually use them. The people who actually use what they buy are called **consumers.**

Name some wholesale companies that you know. Name some retail firms that you know. Could a firm be a manufacturing firm and a wholesale firm and a retail firm all in one? Are there many such firms? Why? If you were buying a pair of shoes, to what kind of firm would you go to buy them?

Because wholesale companies and large retail companies buy large orders of things, they are given a dealer's **trade discount.** You will notice that 20% of $1466 is subtracted from the Dean Brothers' bill. The $293.20 is their trade discount.

Go over the figuring in the Showers Brothers Company's bill and see if it is right.

Finding Trade Discounts

1. On August 1, 1928, Marshall Field & Co., Chicago, Ill., sold the following bill of goods to The Price Mercantile Co., Madison, Wis., sent by freight, subject to a dealer's trade discount of $33\frac{1}{3}\%$. Make out an **invoice,** or bill, like the one shown on page 317. Find

the amount of the discount and the amount The Price Mercantile Company had to pay.

12 women's dresses @ $17.50 each
24 women's aprons @ $18 per dozen
6 women's coats @ $42.50 each
6 misses' coats @ $32.50 each
36 women's house dresses @ $2.95 each

2. On August 15, 1928, the Simmons Hardware Co., St. Louis, Mo., sold to The Stearns Hardware Co., Hot Springs, Ark., the following bill of hardware, subject to a dealer's trade discount of 25%:

3 stoves @ $37.50 each
10 kegs nails, 100 lb. each, @ 6¢ a pound
1 washing machine @ $85
3 wheelbarrows @ $7.50 each

Make out a bill like the one on page 317 and show the total amount of the bill, the amount of the trade discount, and the amount that The Stearns Hardware Co. had to pay for these goods.

General Practice 31

Work these examples and problems. Time, 15 minutes.

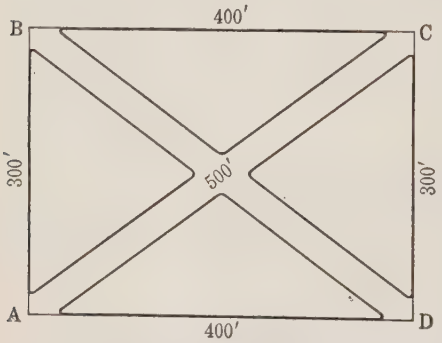
1.	2.	3.	4.
Add:	Multiply:	Divide:	Subtract:
$3\frac{1}{4}$	$3\frac{7}{8} \times 2\frac{2}{3}$	$72\overline{)25{,}920}$	$37,006
$2\frac{5}{8}$			29,897
$\frac{7}{12}$			
$5\frac{2}{3}$			

5.	6.	7.	8.
Add:	Add:	Multiply:	Divide:
5 bu. 3 pk. 7 bu. 2 pk.	5.8 + 16.32	72.9 .018	$3\frac{15}{16} \div 1\frac{3}{4}$

9. On Monday the sixth grade had a spelling test of 25 words. The teacher marked the papers and wrote some of the marks on the board. Helen got 64%; John, 92%; Margaret, 96%; Arthur, 60%; Henry, 84%; Jean, 80%; and James, 72%. How many words did each one miss?

10. Mary bought a hat for \$3.65 and a pair of gloves for \$1.98. What pieces of money should Mary receive in change from a \$10 bill?

11. Miss Brown, the teacher, has a package of paper containing 500 sheets. She has a class of 28 pupils, and she wishes to give each pupil 6 sheets of paper from the package. How many sheets of paper will Miss Brown have left?



Scale: 1″ = 200′

12. A park is 300 feet wide and 400 feet long, with walks across the park from corner to corner, as shown. How many feet are saved by walking through the park from A to C rather than walking around the park from A to B and from B to C?

13. During the summer vacation Jack earned \$9.85 by selling papers, \$5.30 by running errands, and \$13.45

by mowing lawns. One evening Jack had his father guess how much he had earned all together. "I think you have not earned as much as $20," said Jack's father. "Yes, I have," said Jack, "I have earned nearer $30." "That is fine. How much less than $30 have you?" said Jack's father. "In just a minute I'll tell you," said Jack. How much less did Jack have?

14. Helen's mother told her that she might have all she could make from selling eggs. One week Helen gathered and sold eggs as follows: Monday, 2 dozen and 3 eggs; Tuesday, 1 dozen and 7 eggs; Wednesday, 2 dozen and 5 eggs; Thursday, 1 dozen and 8 eggs; Friday, 1 dozen and 6 eggs; and Saturday, 2 dozen and 2 eggs. On Saturday she sold all these eggs at 28¢ a dozen. How much money did Helen receive for the eggs?

15. In a race a cross-country runner won the championship by running 6 miles in 30 minutes, $36\frac{4}{5}$ seconds. What was his average time per mile?

Practice in Subtracting Denominate Numbers

Copy and subtract:

1. Subtract 5 ft. 8 in. from 9 ft. 3 in.

2. 12 lb. 5 oz. − 7 lb. 9 oz. = ?

3. What is the difference between 6 bu. 3 pk. and 8 bu. 1 pk.?

4. 9 gal. 1 qt. − 5 gal. 3 qt. = ?

5. Take 4 mo. 13 da. from 9 mo. 5 da. (Use 30 da. for 1 mo.)

6. Subtract 2 T. 1400 lb. from 5 T. 300 lb.

7. 37 min. 10 sec. − 14 min. 59 sec. = ?

Trade Discount and Cash Discount

Sometimes both a trade discount and a cash discount are given, as in the bill shown here.

Kansas City, Mo., Aug. 3, 1928

Jacob Katz & Company
Stillwater, Oklahoma

Bought of

BURNHAM, MUNGER, AND ROOT

Aug.	3	6 Women's Suits	@ $32.50	$195	00	
"	3	12 Misses' Coats	@ 27.50	330	00	
"	3	6 Women's Coats	@ 30.00	180	00	
						$705 00
		Less 25% trade discount				176 25
						528 75
		Less 2% discount for cash				10 57
						$518 18

When two discounts are given, figure the first one, subtract, and then figure the other. The discounts must be figured separately. Each is figured on what is left from the previous discount. Figure the discounts in the bill on this page and see if they are right.

1. Copy this bill and fill in the proper amounts for the bill L. S. Ayres & Co. had to pay for this shipment:

Chicago, Ill., May 1, 1928

L. S. Ayres & Co.
Indianapolis, Indiana

Bought of
CARSON, PIRIE, SCOTT & COMPANY

May	1	3 Women's Coats @ $52.50 each				
"	1	6 Girls' Dresses @ 17.50 each				
"	1	12 Women's and Misses' Aprons @ .95 each				
		Less 25% trade discount				
		Less 2% discount for cash				

2. The Shepherd-Gordon Mercantile Co. bought goods from John Wanamaker & Co. amounting to $1247.85. The Shepherd-Gordon Mercantile Co. is allowed 25% trade discount on the total amount of

the bill and an additional 2% discount if it pays cash. How much will the trade discount be? How much will the cash discount be? How much will the Shepherd-Gordon Mercantile Co. have to pay if it does not take advantage of the cash discount? How much if it does take advantage of the cash discount?

General Practice 32

Work these examples and problems. Time, 15 minutes.

1.	2.	3.	4.
Add:	Add:	Subtract:	Divide:
$\frac{5}{6}$	9.72	8 lb. 5 oz.	
$\frac{3}{7}$	5.8	3 lb. 12 oz.	$.014\overline{)42}$
$3\frac{1}{4}$	.375		
	200.		
	1.83		
	.657		
	2.43		

5.	6.	7.	8.
Divide:	Change	Subtract:	Multiply:
$6\frac{2}{3} \div 3\frac{1}{7}$	18 lb. 7 oz. to ounces.	32,020 1,719	$7\frac{5}{12} \times \frac{3}{8}$

9. Which is more, and how much, nine hundred-thousandths or nine hundred thousandths?

10. Which is cheaper, 3 lemons for a dime or 7 lemons for a quarter? How much cheaper per lemon?

11. When candy is selling at 40¢ a pound, how many ounces should you get for 25¢?

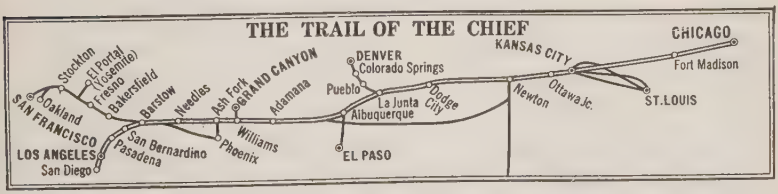
12. A carpenter charges 85¢ an hour for his work. If he works from 8 o'clock until 12 o'clock and from 1 o'clock until 5 o'clock each week day except Saturday and if he works from 8 o'clock until 1 o'clock on Saturday, how much does he earn in a week?

13. How much fencing is needed for a rectangular piece of land that is 20 rods wide and 80 rods long? How much fencing is needed for a piece that is 40 rods square? What is the difference? Can you raise as much on the first piece of land as you can on the second piece of land if the soil is equally good?

14. Which is more, and how much, 5 square feet or a 5-foot square?

15. The Varsity basket-ball team has won $83\frac{1}{3}\%$ of its games. What per cent of its games has it lost?

Finding Time and Distance on Railroads



The Atchison, Topeka, and Santa Fe Railway Company runs a train from Chicago, Illinois, to San Diego, California, which they call the "Chief." The route the train follows is called the "Trail of the Chief." The table on page 326 shows the names of the important cities on the way, the distance in miles each city is from Chicago, and the day and time of day the "Chief" arrives at each city.

From your study of geography, you probably know

the facts given in the next two paragraphs. But, in case you need to review them, you can study them here.

C.T. means Central Time. M.T. means Mountain Time. Mountain Time is 1 hour earlier than Central Time; that is, when it is 10:00 A.M. Monday in Central Time, it is 9:00 A.M. Monday in Mountain Time.

P.T. means Pacific Time. Pacific Time is 1 hour earlier than Mountain Time and 2 hours earlier than Central Time; that is, when it is 3:00 P.M. Tuesday in Central Time, it is 1:00 P.M. Tuesday in Pacific Time.

Why do you not find the abbreviation for Eastern Time (E.T.) in the list below?

Miles	Cities	Time	Day
0	Lv. Chicago	8:00 P.M. C.T.	Sunday
451	Ar. Kansas City	7:35 A.M. C.T.	Monday
636	Ar. Newton	1:00 P.M. C.T.	Monday
789	Ar. Dodge City	3:55 P.M. C.T.	Monday
991	Ar. La Junta	8:45 P.M. M.T.	Monday
1073	Ar. Trinidad	11:00 P.M. M.T.	Monday
1206	Ar. Las Vegas	3:30 A.M. M.T.	Tuesday
1272	Ar. Lamy	6:10 A.M. M.T.	Tuesday
1339	Ar. Albuquerque	8:10 A.M. M.T.	Tuesday
1720	Ar. Williams	6:35 P.M. P.T.	Tuesday
1743	Ar. Ash Fork	7:25 P.M. P.T.	Tuesday
1920	Ar. Needles	11:15 P.M. P.T.	Tuesday
2087	Ar. Barstow	3.55 A.M. P.T.	Wednesday
2168	Ar. San Bernardino	6:30 A.M. P.T.	Wednesday
2218	Ar. Pasadena	8:25 A.M. P.T.	Wednesday
2228	Ar. Los Angeles	9:00 A.M. P.T.	Wednesday
2354	Ar. San Diego	1:00 P.M. P.T.	Wednesday

1. How many miles is it from Chicago to San Diego?

2. Which city is about halfway between Chicago and San Diego?

3. Is Las Vegas more or less than halfway from Chicago to San Diego?

4. How many miles is it from Kansas City to Barstow?

5. Which is a longer distance, from Dodge City to Williams or from Albuquerque to Los Angeles? How much longer?

6. How many hours does it take for the "Chief" to make the trip from Chicago to San Diego? (Remember, you will have to add 1 hour each time the train enters a new time belt.) How many whole days and how many hours left over is this?

7. If you start from Chicago on Thursday, on what day should you arrive in San Diego?

8. How many hours does it take the "Chief" to run from Trinidad to San Bernardino? How many days and hours is this?

9. If you start from Trinidad on Thursday, on what day should you arrive in Los Angeles? How many hours does it take to travel this distance?

Multiplication Practice

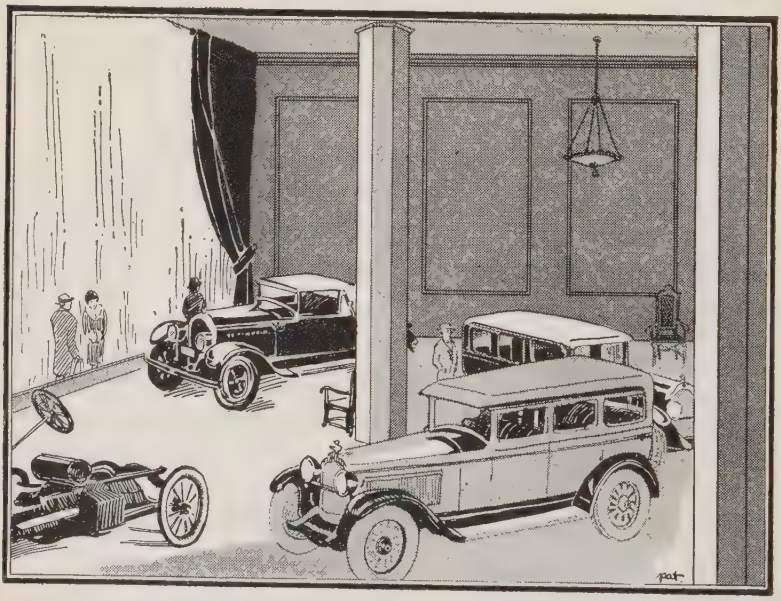
Copy and multiply:

	1.	2.	3.	4.
(A)	59	867	597	6938
	76	38	875	95

	1.	2.	3.	4.
(B)	4987	3697	3877	42,907
	905	800	4596	6893
(C)	5247	6928	837	6205
	315	90	493	907

Selling on Commission

Sometimes a person sells something for another person or a company, and the person who does the selling



is given a per cent of the price of what he sells for having made the sale. For example, houses are usually sold with this kind of agreement. If a salesman sold a

house for $5000 and he was selling on a 5% commission, he would receive 5% of $5000, or $250, for having made the sale. So, you see, when a person **sells on commission,** he receives a certain per cent of the price of the thing that was sold. This per cent is the salesman's **commission.**

Automobiles are usually sold on a "commission basis." Here are the prices of some automobiles and the rate of commission. Find how much the commission will be on each automobile.

Price	Rate of Commission	Amount of Commission
$675	18%	
1400	20%	
2000	25%	
2800	30%	
3500	30%	
5500	35%	

Practice in Dividing Common Fractions and Mixed Numbers

Divide these fractions and mixed numbers. Be sure to reduce each quotient to its lowest terms. Do not use decimals.

	1.	2.	3.
(A)	$\frac{2}{3} \div \frac{1}{8}$	$\frac{5}{6} \div 4$	$\frac{3}{16} \div 2\frac{1}{5}$
(B)	$\frac{5}{7} \div 12$	$8 \div \frac{5}{6}$	$6 \div 3\frac{1}{2}$
(C)	$\frac{1}{6} \div \frac{3}{4}$	$6\frac{1}{8} \div 7$	$4\frac{1}{2} \div 5\frac{1}{4}$

General Practice 33

Work these examples and problems. Time, 15 minutes.

1.	2.	3.	4.
Add:	Multiply:	Subtract:	Divide:
571	$37.42	10 lb. 3 oz.	
293	.075	5 lb. 8 oz.	193)393,720
68			
7			
49			
823			
1642			
75			

5.	6.	7.	8.
Multiply:	Add:	Divide:	Subtract:
$2\frac{1}{3}$ by $6\frac{2}{7}$	$32\frac{3}{5}$		42.3 − 8.371
	$7\frac{1}{3}$	.086)$18.06	
	$\frac{11}{12}$		

9. Henry's father is thinking of buying a farm. He can get a farm of 160 acres for $35 an acre. If he buys this farm, what will it cost?

10. Mrs. Jones raises turkeys. Just before Thanksgiving she sold 524 pounds of turkey at $47\frac{1}{2}¢$ a pound. If the total expense of raising the turkeys was $52.80, how much did Mrs. Jones make?

11. Which is more, and how many ounces more, $\frac{1}{4}$ of a pound or $\frac{3}{8}$ of a pound?

12. Aunt Mary gave James \$8.25 for his birthday, and his mother gave him \$2.50. He spent \$1.56 and put the remainder in a bank. How much did he put in the bank?

13. How many pounds, and how many ounces over, are there in 5146 ounces?

14. If 1 pound of cheese costs \$.35, how many pounds of cheese can be bought for \$5.95?

15. The city baseball team lost 35.1% of the games it played last year. If no games were tied, what per cent of its games did it win?

Chapter Review

Here is a review of what you have studied in this chapter. Write the numbers 1 to 10 on a sheet of paper. After each number you have written, write the answer to the question that has the same number.

At the end of each question you will see a page number. If you missed any part of the test, turn back to the page number given after that part of the test, where you will find how to answer what you missed. Study what you missed until you are sure you know what to do. Then go back to the chapter review and again try the part you missed. Do this until you do not miss anything or until your teacher tells you to work on something else.

1. What is a discount? (Page 312)

2. If a sweater was first marked to sell for \$10.00 and then at a sale a discount of 10% was allowed, what was the selling price of the sweater? (Page 312)

3. What does "15% off" mean? (Page 312)

4. A retail clothing store was allowed a discount of 20% and another discount of 2% on a bill for \$600. How much was the bill after both discounts had been allowed? (Page 322)

5. What is a commission? (Page 329)

6. What is a retail company? (Page 318)

7. A man sold a house and lot for \$7000. If he received a commission of $2\frac{1}{2}\%$ for making the sale, how much did he receive? (Page 329)

8. What is a dealer's trade discount? (Page 318)

9. When is a discount a cash discount? (Page 314)

10. What is an invoice? (Page 317)

CHAPTER XVIII

Angles, Parallel Lines, Parallelograms, and Triangles

The Three Different Kinds of Angles

"Angle" may be written like this: ∠. "Right angle" may be written like this: rt. ∠.

"Angles" may be written like this: ∡. "Right angles" may be written like this: rt. ∡.

When two straight lines meet, angles are made.

The point where the sides of an angle meet is called the **vertex** of the angle.

You already know what a right angle is. Now you are going to learn about the two other kinds of angles. Pick out all the right angles you see in the figures below.

You should have found three right angles because angles *a*, *d*, and *e* are right angles. Angle *b* is an **acute** angle, and angle *c* is an **obtuse** angle. What kind of angle is angle *f*? What kind of angle is angle *g*?

Is angle *b* larger or smaller than angle *a*? What kind of angle is angle *a*? Is angle *f* smaller or larger than angle *e*? What kind of angle is angle *f*? What kind of angle is angle *e*? See if you can make a definition for an acute angle. See if the definition you made agrees with the one you will find on this page.

What kind of angle is angle *c*? Is angle *c* larger or smaller than angle *a*? What kind of angle is angle *a*? Is angle *g* smaller or larger than angle *d*? What kind of angle is angle *d*? What kind of angle is angle *g*? Now see if you can make a definition for an obtuse angle. Does it agree with the definition you find on this page?

Angles smaller than right angles are called acute angles.

Angles larger than right angles are called obtuse angles.

The three kinds of angles are right angles, acute angles, and obtuse angles.

1. Find some right angles in the room where you are now. Draw three right angles.

2. Find some acute angles in the room where you are now. Draw three acute angles.

3. Find some obtuse angles in the room where you are now. Draw three obtuse angles.

Parallel Lines

"Parallel lines" may be written like this: || lines.

What do you think parallel lines are? Among the figures given here, find all those that you think are parallel lines.

Figure 1 Figure 2 Figure 3 Figure 4 Figure 5

Parallel lines are straight lines that are the same distance apart throughout their lengths and that will never meet.

You should have found three sets of parallel lines. If you did not, look again, because figures 2, 3, and 5 are parallel lines.

Draw four sets of parallel lines. Now draw four sets of lines that are not parallel. How do the parallel lines you drew differ from the lines you have drawn that are not parallel?

Parallelograms

"Parallelogram" may be written like this: □.

"Parallelograms" may be written like this: □.

What do you think parallelograms are? Among the figures given below, pick out all those that you think are parallelograms.

Figure 1

Figure 2

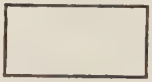
Figure 3 

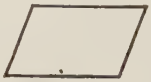
Figure 4 

Figure 5

Figure 6

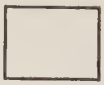
Figure 7 

Figure 8

Figure 9

Figure 10

You should have found five parallelograms. If you did not, look again, because figures 3, 4, 6, 7, and 10 are parallelograms. You remember, of course, that a figure with four straight sides and four right angles is called a rectangle. You also remember that a rectangle whose sides are of equal length is called a square. All rectangles are parallelograms, but not all parallelograms are rectangles. Now define parallelograms.

Any flat surface inclosed by two pairs of parallel lines is called a **parallelogram.**

Find some parallelograms in the room where you are now. Draw three parallelograms.

Practice in Subtracting Decimal Fractions

Copy and subtract:

1. From 34.267 take 7.9.
2. From 426 take 47.63.

3. From 124.3 take 32.518.
4. From 27.536 take 8.67.
5. From 463.7 take 32.6.
6. From 194 take 54.627.
7. From 3.724 take 2.317.
8. From 87.19 take 36.4.
9. From 632.7 take 18.78.

Practice in Multiplying Denominate Numbers

Copy and work these examples.

	1.	2.	3.
(A)	5 lb. 7 oz. 4	17 bu. 3 pk. 8	9 ft. 2 in. 12
(B)	23 yd. 2 ft. 7	6 hr. 41 min. 9	3 ft. 9 in. 7
(C)	12 gal. 2 qt. 6	4 min. 28 sec. 15	32 qt. 1 pt. 9
(D)	9 yd. 1 ft. 9	7 lb. 8 oz. 2	31 hr. 15 min. 8
(E)	9 bu. 2 pk. 3	2 gal. 3 qt. 7	6 min. 9 sec. 9

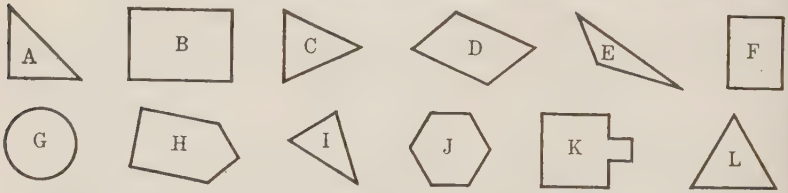
The Triangle

"Triangle" may be written: △. "Triangles" may be written: ⧋.

Figure 1 Figure 2 Figure 3

What is the name of figure 1? What is the name of figure 2? What is the name of figure 3? You have been told the names of figures 1 and 2, but the name of figure 3 has not been given in this book. Figures like figure 3 are called **triangles.**

Pick out all the triangles you see among these figures.



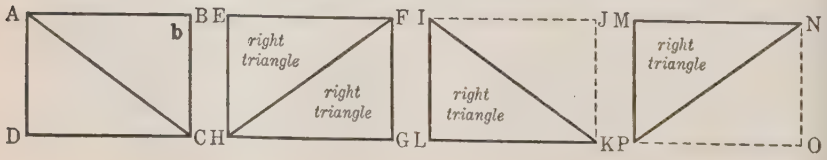
You should have found five triangles, because figures *A*, *C*, *E*, *I*, and *L* are triangles. See if you can make a definition for a triangle.

> Any flat surface inclosed by three straight lines is called a triangle.

The Right Triangle

> "Right triangle" may be written: rt. △.
> "Right triangles" may be written: rt. ◬.

Figure 1 Figure 2 Figure 3 Figure 4

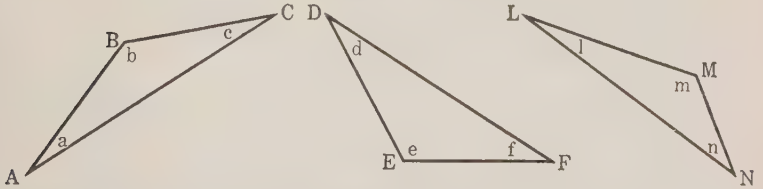


What kind of angle is $\angle b$? What is the name of the figure ABC? Then what kind of triangle is triangle ABC? What kind of triangle is $\triangle HEF$? $\triangle FGH$? $\triangle ILK$? $\triangle MNP$? See if you can make a definition for a right triangle that will agree with the definition on this page.

Any triangle that has a right angle in it is called a **right triangle.**

Draw three right triangles. Are there right triangles in the room where you are now? If so, where?

The Obtuse Triangle



What is the name of figure ABC?

What kind of angle is $\angle b$?

Then what kind of triangle do you think $\triangle ABC$ is?

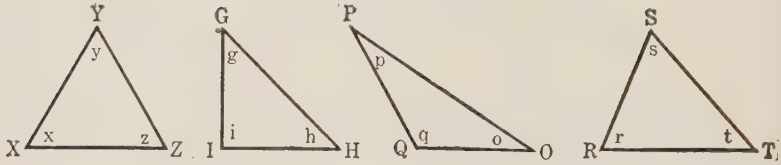
Yes, $\triangle ABC$ is an obtuse triangle. Triangles DEF and LMN are also obtuse triangles.

See if you can make a definition for obtuse triangles.

Any triangle that has an obtuse angle in it is called an **obtuse triangle.**

Draw three obtuse triangles. Are there obtuse triangles in the room where you are now? If so, where?

The Acute Triangle



What is the name of figure XYZ?
What kind of angle is $\angle x$? $\angle z$? $\angle y$?
Can you guess the name of $\triangle XYZ$?
What kind of angle is $\angle i$?
What kind of triangle is $\triangle GIH$?
What kind of angle is $\angle q$?
What kind of triangle is $\triangle PQO$?
What is the name of figure RST?
What kind of angle is $\angle r$? $\angle s$? $\angle t$?
Then what kind of triangle is $\triangle RST$?
Yes, $\triangle RST$ is an acute triangle.
See if you can make a definition for an acute triangle.

> Any triangle in which all the angles are acute angles is called an **acute triangle.**

Draw three acute triangles. Are there acute triangles in the room where you are now? If so, where?

General Practice 34

Work these examples and problems. Time, 15 minutes.

1.	2.	3.	4.
Add:	Reduce:	Multiply:	Subtract:
5 lb. 13 oz.	5216 oz. =	$5\frac{1}{8} \times 3\frac{2}{5}$	21,003
6 lb. 10 oz.	_?_ lb. _?_ oz.		1,096

5.	6.	7.	8.
Multiply:	Subtract:	Add:	Divide:
5.76	$59.08	$57\frac{3}{8}$	
.83	9.19	$7\frac{2}{3}$	$.68\overline{)14.688}$
		$6\frac{1}{2}$	

9. If it takes 1 roasted duck to serve 6 people, how many roasted ducks will be needed for 24 people?

10. If a quart of ice cream will serve 8 people, how many people will 16 quarts serve? How many quarts will be needed for 16 people?

11. Ted wants a bicycle that will cost $49.75. He has $12.80 now, and his father told him that, if he would earn $25 more and save it all, he would give him the rest of the money he needs. If Ted earns and saves the $25, how much more will his father have to give him?

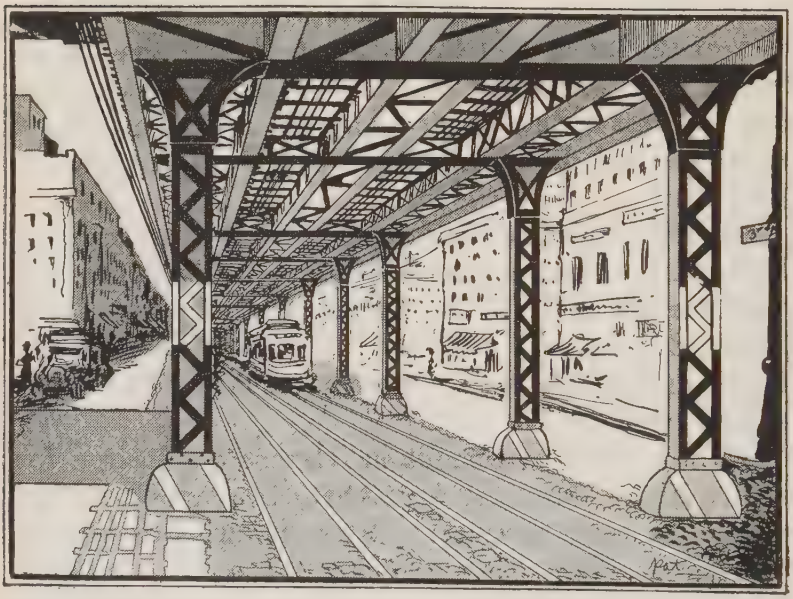
12. Milk is sometimes tested for the per cent of butter fat. The amount of butter fat determines how valuable the milk is for making butter. Mr. Jones sold 138 pounds of milk that tested 3.7% butter fat. How much should he have received if butter fat sold at $43\frac{1}{2}¢$ a pound?

13. Mr. Stewart bought an electric waffle iron for $11.25 and a flashlight for $2.85. How much change should he have received if he gave two $10 bills in payment? What coins and bills might the merchant have given Mr. Stewart to make up this amount of change?

14. On five tests in spelling, Charles made 98%, 86%, 90%, 100%, and 94%. Dick made 92%, 96%, 88%, 98%, and 98%. Which boy made the higher average?

15. Mr. Clifford has a checking account at a bank. On Monday he had a balance of $250.85 in the bank. On Tuesday he put in $140.60 more. On Wednesday he put in $207.96. On Thursday he drew out $495.76. On Friday he put in $197.50 and later in the day drew out $65.00. On Saturday he put in $467.30. How much money did Mr. Clifford have in the bank at the close of business on Saturday?

Finding Angles, Triangles, and Parallelograms in Things about Us



1. In the picture above, find:

   3 acute angles
   3 obtuse angles
   3 right angles

3 right triangles
3 other triangles that are not right triangles
3 sets of parallel lines
3 parallelograms

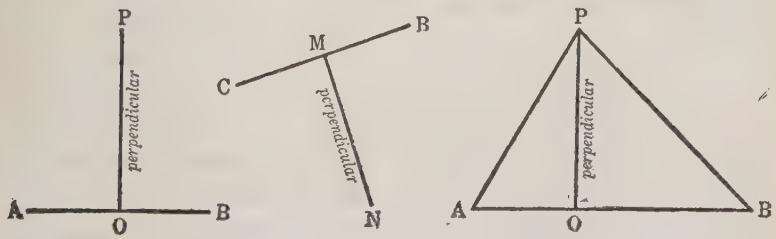
2. On your way to and from school, watch for objects in the form of angles, triangles, or parallelograms and be prepared to tell about them in class.

Long Division Practice

Copy and divide by long division:

	1.	2.	3.
(A)	$48\overline{)2976}$	$68\overline{)26,248}$	$432\overline{)75,643}$
(B)	$62\overline{)52,514}$	$329\overline{)22,043}$	$58\overline{)116,232}$
(C)	$38\overline{)12,464}$	$128\overline{)12,416}$	$509\overline{)156,263}$
(D)	$29\overline{)14,761}$	$98\overline{)8722}$	$62\overline{)78,341}$

Base, Altitude, Hypotenuse, Perpendicular



If you will look carefully at the figures on page 345, you will see some new words that you need to know

in working with triangles and parallelograms. Study these until you know them. What kind of angle is $\angle c$? What kind of a triangle is $\triangle ABC$? What is the name of side AB?

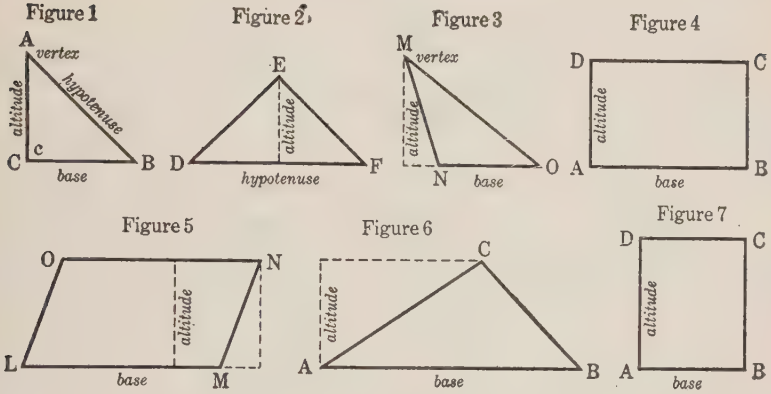
In a right triangle, the side opposite the right angle is called the **hypotenuse.**

The side of a triangle on which the triangle rests or stands is called the **base** of the triangle. Any side may be the base of a triangle.

The side of a parallelogram on which the parallelogram rests or stands is called the **base** of the parallelogram. Any side may be the base of a parallelogram.

A line drawn from the vertex of the angle opposite the base of a triangle **perpendicular** (at right angles) to the base of the triangle is called the **altitude** of the triangle.

A line drawn from the side of a parallelogram opposite the base of the parallelogram perpendicular to the base of the parallelogram is called the **altitude** of the parallelogram.



As you can see from figure 1 on this page, in a right triangle when one of the short sides is used for the base of the triangle, the altitude of the triangle is the other short side. Also, as you can see from figure 4, when a parallelogram is a rectangle and one of the longer sides is used as a base, one of the short sides of the parallelogram is the altitude of the parallelogram.

But, as you can see from figure 2, when the hypotenuse of a right triangle is used as the base of a triangle, the altitude is not a side at all. Also, as you can see from figures 3 and 6, in triangles that are not right triangles the altitude is not a side of the triangle. Likewise, as you can see from figure 5, when a parallelogram is not a rectangle, the altitude of the parallelogram is not a side of the parallelogram.

In any room, it is easy to find lines that are perpendicular to each other. Look about the room where you are now and find at least six examples of lines that are perpendicular to each other. Does a carpenter need to know about perpendicular lines?

General Practice 35

Work these examples and problems. Time, 15 minutes.

1.	2.	3.	4.
Add:	Divide:	Add:	Subtract:
$5.8 + .642 + 3.97$	$38\overline{)15{,}428}$	14 ft. 7 in. 8 in. 6 ft. 0 in. 2 ft. 9 in.	$3.8 - .197$

5.	6.	7.	8.
Multiply:	Subtract:	Divide:	Add:
6.392 4.7	18 lb. 3 oz. 5 lb. 10 oz.	$13\frac{1}{3} \div 5\frac{2}{5}$	\$5.47 6.23 .98 1.43 .87 2.00 .65 3.78 .18

9. Which will require the more fencing, a lot that is 40 ft. by 100 ft. or one that is 50 ft. by 80 ft.? Could you raise as many potatoes on the first lot as on the second lot if the lots were of the same kind of soil?

10. Henry's father earns 85¢ an hour at a factory. He is allowed time and one-half for overtime. On Monday Henry's father worked 8 hours regular time

and 3 hours overtime; on Tuesday, 8 hours regular time and 3 hours overtime; on Wednesday, $7\frac{1}{2}$ hours regular time; on Thursday, 8 hours regular time; on Friday, $7\frac{3}{4}$ hours regular time; and on Saturday, 4 hours regular time and 4 hours overtime. How much did Henry's father earn in the whole week?

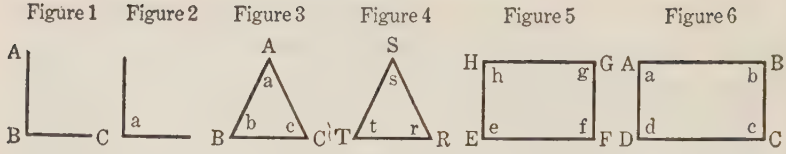
11. Mr. Brown says his oats average 28 bushels to the acre. He has 45 acres of oats. What is the value of Mr. Brown's oat crop at 56¢ a bushel?

12. When bitter-sweet chocolates are 60¢ a pound, how many ounces should you get for 35¢?

13. It costs $5\frac{1}{2}$¢ an hour to run an electric coffee percolator, $3\frac{1}{2}$¢ an hour to run a 3-pound iron, and 5¢ an hour to run a toaster. One day Mrs. Forest used the coffee percolator for 15 minutes, the toaster for 15 minutes, and the iron for 1 hour and 30 minutes. How much did the electricity cost her?

Lettering and Naming Angles, Triangles, and Parallelograms

You already know one way in which we may refer to angles. Here is another way. In figure 1 you will see that there is a capital letter at the end of each of the sides of the angle and another where the sides of the angle meet. The angle in figure 1 on page 348 may be read $\angle ABC$ or $\angle CBA$. You may use any letters you wish in lettering angles. In reading angles lettered in this way, start with the letter at the end of either side of the angle and read the letters as they come. The simpler way of lettering angles is to use a small letter right in the angle, as in figure 2. This angle,



you know, is read $\angle a$. You may use any small letter to letter an angle.

Figures 3 and 4, as you see, are triangles. Triangles are lettered with capital letters. In lettering triangles, you may start at the vertex opposite the base or at either end of the base. Figures 3 and 4 may be read $\triangle ABC$ and $\triangle STR$. Figure 3 might be read $\triangle ACB$, $\triangle CAB$, or $\triangle CBA$. Figure 4 might be read $\triangle SRT$, $\triangle TRS$, or $\triangle RST$. In other words, in reading triangles you may start at any letter and read the other letters as they come. Usually, in reading triangles, we start at the vertex opposite the base and read the letters at the base in either order. As in lettering angles, you may use any capital letters to letter triangles. Notice that the small letters you see in the angles of the triangle correspond to the capital letters placed outside the triangle.

The lettering of the parallelograms in figures 5 and 6 is similar to the lettering in the angles and triangles. As is the case with angles and triangles, any capital letters may be used in lettering parallelograms. Here, as in the triangles, the angles are lettered with small letters corresponding to the capital letters. Figures 5 and 6 may be read $\square EFGH$ and $\square ABCD$. Or, as with triangles, you might start with any letter on the parallelogram and go right around it, reading the letters as they come.

General Practice 36

Work these examples and problems. Time, 15 minutes.

1.	2.	3.	4.
Subtract: 50,002 6,097	Divide: $8\frac{1}{4} \div 2\frac{2}{3}$	Change to a common fraction: .875	Reduce: 4756 in. = _?_ ft. _?_ in.

5.	6.	7.	8.
Add: $.375 .09 6.82 .47 18.00 9.75 .32	Multiply: 7 lb. 5 oz. 9	Subtract: 4.9 − .376	Divide: $.025\overline{)3.6}$

9. On June 22, 1923, the Leviathan, a large ocean liner, made a trial run from a point near the coast of Florida to a point off Cape Henry, Virginia. The ship averaged 27.07 nautical miles, or knots, per hour. A nautical mile is equal to 1.152 statute, or common, miles. What was the average speed of the Leviathan in common, or statute, miles?

10. In many factories the employees are paid with currency instead of checks. In such cases it is convenient for the paymaster to make up each amount with the smallest possible number of pieces of money.

Thus, for \$21.87 the paymaster would put into an envelope the following: 1 twenty-dollar bill, 1 one-dollar bill, 1 half dollar, 1 quarter, 1 dime, and 2 cents. Make a list showing what pieces of money should be used for \$24.93, \$37.65, and \$18.99.

11. William sells papers after school and on Saturdays. He thinks it would be helpful to have a coaster wagon in which to carry his papers. A good wagon will cost \$8.50. He has \$1.75 now and can save \$2.25 a week. How many weeks will it take him to save enough to buy the wagon?

12. Fred works in a grocery store on Saturdays. Last Saturday Mrs. Rogers bought some groceries that cost \$2.89. She gave Fred a ten-dollar bill in payment. Fred gave to Mrs. Rogers, in change, 1 penny, 1 dime, 3 one-dollar bills, and 1 five-dollar bill. Mrs. Rogers said: "I believe you have made a mistake, Fred. Better count it again." Fred did and found his error. What pieces of money should Fred have given Mrs. Rogers?

Chapter Review

On pages 351 and 352 is a review of what you have studied in this chapter. Write the numbers 1 to 20 on a sheet of paper. After each number you have written, write the answer to the question that has the same number.

At the end of each question you will see a page number. If you missed any part of the test, turn back to the page number given after that part of the test, where you will find how to answer what you missed. Study what you missed until you are sure you know what to do. Then go back to the chapter review

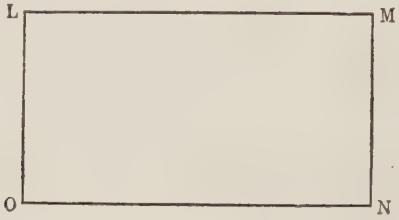
and again try the part you missed. Do this until you do not miss anything or until your teacher tells you to work on something else.

1. What is an angle? (Page 333)
2. What is the vertex of an angle? (Page 333)
3. Draw three kinds of angles and name them. (Page 334)
4. Join the sides of each of the angles you have just drawn with another line and tell what kind of triangles you have. (Pages 339 and 340)
5. What is the difference between an acute triangle and an obtuse triangle? (Pages 339 and 340)
6. What are the names of the three sides of a right triangle? (Page 344)
7. Which side of a right triangle is the hypotenuse? (Page 344)
8. How do you know which side of a triangle or a rectangle is the base? (Page 344)
9. Draw a right triangle so that the hypotenuse is the base. (Page 345)
10. When is a line perpendicular to another line? (Page 344)
11. Draw an acute triangle and mark the base and the altitude. (Page 340)
12. What are parallel lines? (Page 335)
13. How many pairs of parallel lines are there in a parallelogram? (Page 336)
14. Name the kind of angles in a rectangle. (Page 366)
15. Draw a parallelogram that is a rectangle and another that is not a rectangle. (Page 366)
16. Letter the second parallelogram you drew and tell what kind of angle each of the angles is. (Page 347)

17. In how many ways can you read the parallelogram you have just lettered? (Page 348)

18. When is a side of a parallelogram not the altitude of the parallelogram? (Page 345)

19. Show a short way of writing the word "triangles." (Page 338)



20. How can you letter the angles of the rectangle above so that you can read each of them with a single letter? (Page 348)

CHAPTER XIX

Using Arithmetic in Working with Money

Sales Slips

John went to the grocery store for his mother and bought the following articles: 1 lb. of coffee, 2 lb. of bacon, 1 doz. eggs, $\frac{1}{2}$ doz. oranges, 5 lb. of sugar, and 2 cans of corn.

The clerk wrote the order in his sales book. He used a piece of carbon paper and made two copies of

the order. He kept the top sheet and gave John the carbon copy. At the left is a copy of the sales slip.

THE PEOPLE'S GROCERY
PARIS, ILL.

612 DATE 4/26/1928 PHONE GROVE 65

NAME Mrs. H. C. Simmons

ADDRESS 3242 Vine St.

1 lb.	coffee @ 50¢	$ .50
2 lb.	bacon @ 42¢	.84
1 doz.	eggs @ 46¢	.46
½ doz.	oranges @ 60¢	.30
5 lb.	sugar @ 7¢	.35
2 c.	corn @ 23¢	.46
		$2.91

The first column on the sales slip shows the amount bought. The middle column shows the article and the price per unit. The last column shows the cost of the amount purchased.

On what date was the sales slip made out for John's order?

Make sales slips for the following orders. Choose the name of some store you know as the store from which the order is bought, the name of some person you know for the person buying the goods, and the date on which you make the sales slips as the date on which the goods are bought.

1. 5 yd. of linen at 50¢ a yard, 2 spools of thread at 10¢ each, 1 pattern at 45¢.

2. 6 glasses at 10¢, 2 dishes at $1.25, 1 vase at 75¢, 1 flower holder at 39¢.

3. $3\frac{1}{2}$ lb. of roast beef at 48¢ per lb., $2\frac{1}{4}$ lb. of bacon at 36¢ per lb., 2 lb. of lard at 14¢ per lb., $\frac{3}{4}$ lb. of cheese at 48¢ per lb.

4. 5 lb. of potatoes at 5¢ per lb., 2 qt. of string beans at 20¢ per qt., $4\frac{1}{2}$ lb. of apples at 12¢ per lb., 10 lb. of sugar at $6\frac{1}{2}$¢ per lb.

5. If you can, get some sales slips from your grocer or butcher and bring them to class. Make out orders with yourself as purchaser.

Practice in Dividing Decimals

Copy and divide these numbers:

	1.	2.	3.
(A)	$25\overline{)37}$	$.12\overline{)96}$	$.3\overline{)96}$
(B)	$.96\overline{).48}$	$.9\overline{).468}$	$17\overline{).85}$
(C)	$.25\overline{)5}$	$32\overline{).256}$	$.082\overline{).42}$
(D)	$.701\overline{).701}$	$.7\overline{).49}$	$.43\overline{).387}$
(E)	$.132\overline{)2182}$	$.008\overline{).4}$	$.5\overline{).9}$

Savings Accounts

The sixth grade of the Irving School has a school savings account, and each pupil has a bank book in which the teacher enters the amounts saved and deposited. In the fifth grade you learned about one of these bank books. As you know, there are columns for the dates of the deposits, the amounts of the deposits, and the total deposited. On page 356 you will find a copy of Chester Brown's bank book, showing his deposits and totals for October.

THE IRVING SCHOOL SAVINGS BANK

IN ACCOUNT WITH

Chester Brown *Depositor*

DATES	DEPOSITS	TOTALS
Oct. 3	25	25
Oct. 4	10	35
Oct. 6	05	40
Oct. 10	15	55
Oct. 17	20	75
Oct. 20	25	1 00
Oct. 23	15	1 15
Oct. 24	50	1 65
Oct. 27	10	1 75
Oct. 28	15	1 90
Oct. 30	25	2 15
Oct. 31	20	2 35

1. How much did Chester Brown put in the bank on October 3?
2. How much did he put in the bank on October 17?
3. What was the total in the bank on October 3?
4. What was the total in the bank on October 17?
5. What amount was deposited on October 24?
6. What was the total on October 24?
7. What was the total on October 31?
8. What could you do to find out whether this total is correct?
9. Get a savings bank book, containing a real account, from some of your relatives or friends. If there is anything in it that is different from the one given above, get someone to explain it to you and then you explain it to your class.

10. Copy and complete the following savings account:

THE IRVING SCHOOL SAVINGS BANK

IN ACCOUNT WITH

Helen Brandon *Depositor*

DATES		DEPOSITS		TOTALS	
Nov.	1		35		
Nov.	2	1	25		
Nov.	3		15		
Nov.	6		82		
Nov.	10		37		
Nov.	13	1	00		
Nov.	14		45		
Nov.	17		87		
Nov.	20		62		
Nov.	24		39		
Nov.	30		95		

Keeping Accounts

Not only do you need to know how to account for the money you receive, but you also need to account for the money you spend. Money that is taken in is called **receipts,** and money that is paid out is called **expenditures.** Nearly every business man keeps an exact record of his receipts and expenditures. Sometimes they are kept in separate books, but usually they are kept in the same book with the receipts on the left side and the expenditures on the right side. On page 358 you will see the way you should keep a record of receipts and expenditures.

1928	Receipts			1928	Expenditures		
May 1	Brought forward from April	2	30	May 2	Club dues		50
May 4	Sold chickens	3	25	May 4	Savings account	2	25
May 11	Sold eggs	1	30	May 15	Bought cap	1	00
May 20	Washed windows		75	May 16	Malted milk		20
May 27	Whitewashed back fence	1	00	May 25	Car fare		16
				May 26	Stamps		12
				May 29	Pencils		10
				May 31	Balance		

1. Find the **balance** to be carried forward for June; that is, the amount of money that was left at the end of May.

Here are the accounts of Robert Foster and Helen Brown for a month. Make an account like the sample above and show the balance at the end of the month.

2. Robert Foster's account for August, 1928:

Brought forward from July, $3.55
Bought fish hooks, Aug. 2, 15¢
Received for mowing lawn, Aug. 7, 50¢
Put in savings account, Aug. 12, $2.50
Received for weeding garden, Aug. 17, 45¢
Birthday present from Aunt Ruth, Aug. 20, $2.00
Bought bell for bicycle, Aug. 25, $1.00
Ran errands, Aug. 26, 25¢
Went to circus, Aug. 26, 50¢

Cleaned back yard, Aug. 28, 35¢
Watered lawn for month, Aug. 31, $1.00

3. Helen Brown's account for June, 1927:
Balance from May, June 1, $2.80
Bought water color paints, June 2, 50¢
Picked strawberries, June 7, 75¢
Bought candy, June 12, 15¢
Put in savings account, June 14, $1.50
Sold pansies, June 15, 45¢
Received monthly allowance, June 15, $1.00
Polished silver for Mother, June 18, 35¢
Present for Louise, June 25, 50¢
Went to movie, June 27, 25¢

General Practice 37

Work these examples and problems. Time, 15 minutes.

1.	2.	3.	4.
Add:	Add:	Multiply:	Divide to
$5.7 + 2.86 + .013$	$2\frac{5}{8}$	\$5987	3 places:
	$\frac{2}{3}$	867	
	$4\frac{7}{12}$		$32\overline{)17}$
	$3\frac{1}{4}$		
	$\frac{7}{16}$		

5.	6.	7.	8.
Subtract:	Multiply:	Subtract:	Divide to
$87\frac{1}{2}$	429	290,010	3 places:
$76\frac{5}{8}$	.83	5,891	$64\overline{)3.7}$

9. Yesterday Mr. Brown worked from 8:45 in the morning until 5:35 in the afternoon, with 35 minutes off for lunch. How many hours and minutes did Mr. Brown work yesterday?

10. Mrs. Adams does private sewing and dressmaking at 60¢ an hour. How much will she earn in 8 hours, 20 minutes?

11. Mr. Young lives exactly 5.6 miles from the parking station near his office down town. If the speedometer on Mr. Young's automobile registered 58.9 miles when he started down town, what did it register when he reached the parking station?

12. It is 242.8 miles from Janesville, Wisconsin, to Springfield, Illinois. From Springfield, Illinois, to Kansas City, Missouri, it is 350.1 miles. How far is it from Janesville, Wisconsin, to Kansas City, Missouri, by way of Springfield, Illinois?

13. Mr. Brandon runs a grocery store. He keeps an accurate record of his sales and expenses each year. Last year his expenses were 18.4% of his sales; two years ago his expenses were 24.6% of his sales; three years ago, 22.7%; four years ago, 25.8%. What was the average per cent for the four years? Do you think this average is a fair guide as to what his expenses will be next year?

14. Mr. Brown bought 10 gallons of gasoline at 21.3¢ a gallon. What change should he have received from a five-dollar bill?

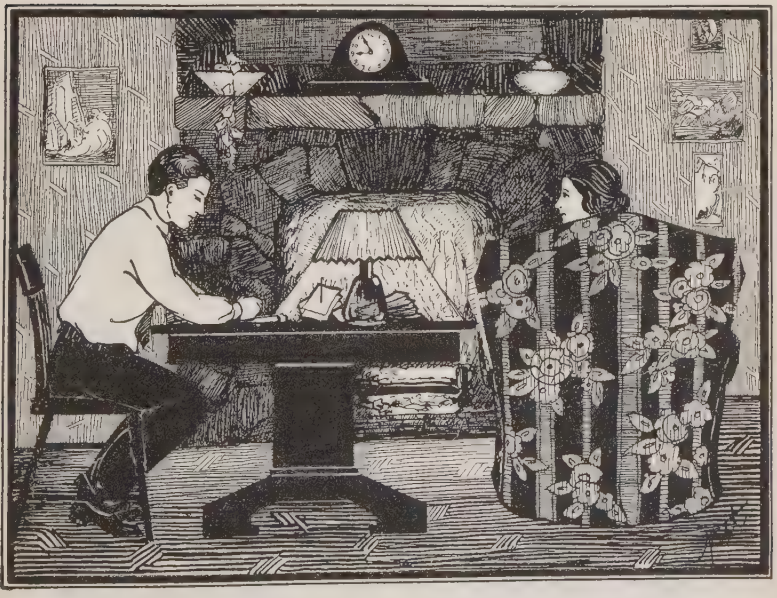
15. A bushel contains 1.244 cubic feet. How many bushels are there in a bin that is 8 feet wide, 10 feet long, and 6 feet high? (Find the answer to the nearest tenth of a bushel.)

Practice in Multiplying Fractions and Mixed Numbers

Multiply the following fractions and mixed numbers:

	1.	2.	3.	4.
(A)	$\frac{13}{16} \times \frac{3}{5}$	$\frac{5}{8} \times 4\frac{3}{5}$	$\frac{5}{9} \times \frac{7}{15}$	$\frac{8}{11} \times \frac{3}{4}$
(B)	$2\frac{2}{3} \times 9$	$\frac{7}{12} \times \frac{3}{8}$	$\frac{11}{12} \times 6$	$\frac{2}{3} \times \frac{6}{7}$
(C)	$\frac{8}{15} \times \frac{3}{4}$	$15 \times \frac{8}{9}$	$\frac{2}{3} \times \frac{15}{16}$	$1\frac{2}{3} \times 3\frac{3}{7}$
(D)	$\frac{8}{9} \times \frac{3}{4}$	$7 \times 4\frac{4}{5}$	$3\frac{2}{3} \times 2\frac{1}{3}$	$2\frac{1}{3} \times 6\frac{3}{4}$

Budgets



The money which a family has to live on during a year is called the **yearly income** of the family. Wise people plan to use their income in such a way that they will get the most good from it. A plan for spending

money is called a **budget.** A budget must be based on the income a person expects to have.

The Webster family's income was $1600 a year. This is the way the Websters planned to spend the $1600.

BUDGET

Shelter	$400
Food	400
Clothing	300
Heat and light	100
Savings	200
Amusements and other expenses	200
	$1600

1. What fractional part of the income was spent for shelter?
2. What fractional part was spent for food?
3. What fractional part was spent for clothing?
4. What fractional part was spent for heat and light?
5. What fractional part was saved?
6. What fractional part was spent for amusements and other expenses?
7. Mr. White earned $2400 a year. If he planned to spend the same fractional part of his income for each budget item as the Websters spent, how much would he spend for shelter?
8. How much would he spend for food?
9. How much would he spend for clothing?
10. How much would he spend for heat and light?
11. How much would he save?
12. How much would he spend for amusements and other expenses?

Problems about Budgets

Many boys and girls make budgets for their own money.

1. Here is Jack Rogers' budget:

Savings	$\frac{1}{2}$, or 50%
Amusements	$\frac{1}{4}$, or 25%
Books, supplies	$\frac{1}{4}$, or 25%

During January and February, Jack Rogers earned \$4.24. According to his budget, how much did he save? How much did he spend for amusements? How much did he spend for supplies?

2. Mary Alice has an allowance of 75¢ a week. She plans to save $\frac{2}{5}$, to spend $\frac{2}{5}$ for amusements, and to spend $\frac{1}{5}$ for school supplies. How much does she save each week? How much does she spend for amusements each week? How much does she spend for supplies each week?

3. Tom White has a paper route and helps to support himself. He planned the following budget:

Savings	$\frac{1}{5}$, or 20%
Clothes	$\frac{3}{5}$, or 60%
Supplies	$\frac{1}{10}$, or 10%
Amusements and other expenses	$\frac{1}{10}$, or 10%

In January he earned \$30. According to this budget, how much could Tom save in January? How much could he spend for clothes? How much could he spend for supplies? How much could he spend for amusements and other expenses?

4. Tom's brother is married. He earns $200 a month. He and his wife made out this budget:

$\frac{1}{4}$, or 25%, for rent — $\frac{1}{5}$, or 20%, for food
$\frac{1}{5}$, or 20%, for clothes — $\frac{1}{20}$, or 5%, for heat and light
$\frac{1}{20}$, or 5%, for insurance — $\frac{3}{20}$, or 15%, for savings
$\frac{1}{10}$, or 10%, for amusements and charity

If they followed their budget, how much was spent on each item each month?

General Practice 38

Work these examples and problems. Time, 15 minutes.

1.	2.	3.	4.
Subtract: $\frac{15}{16} - \frac{2}{3}$	Change to an improper fraction: $18\frac{7}{8}$	Change to a common fraction: $.56\frac{1}{4}$	Multiply: .758 × 4.5
5.	**6.**	**7.**	**8.**
Add: $376, 29, 1847, 509	Subtract: 42.6 − 3.874	Divide: .72)$77,760	Add: 5 ft. 10 in., 3 ft. 7 in., 11 in.

9. Add 3 hr. 6 min., 1 hr. 32 min., 2 hr. 27 min., and 2 hr. 56 min.

10. Subtract 8 pk. 6 qt. from 13 pk. 2 qt.

11. Mr. Jones spent $\frac{3}{4}$ of his money. What per cent of his money did he have left?

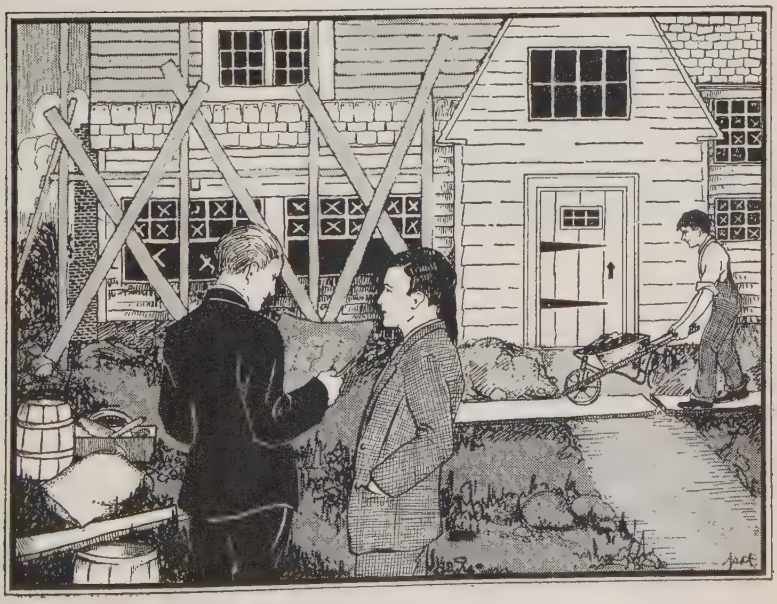
12. Cleo practiced on the piano for 45 minutes. She wants to practice an hour and a half every day. What part of that time did she practice?

13. A family spent 25% of its yearly income for food, 20% for rent, 20% for clothing, and 15% for recreation and saved the rest. What per cent of their income did the family save?

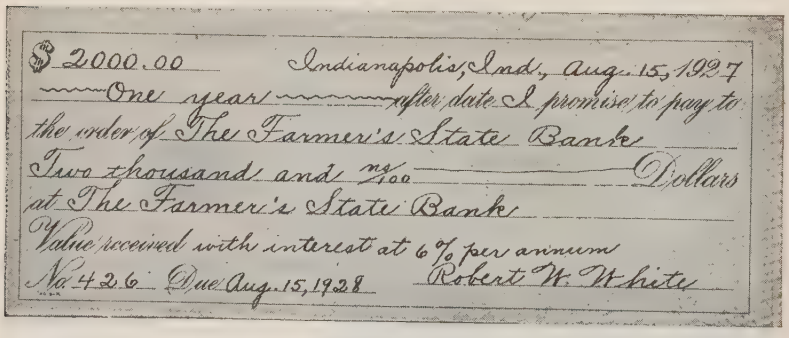
14. Mr. Wilson is supposed to work 8 hours a day. One day he worked only 5 hours. If he receives $10 for 8 hours' work, how much should he receive for 5 hours' work?

15. It costs $26,000, on the average, to build one mile of concrete road. How many miles of concrete road can be built for $125,000 and how many dollars will be left over? What part of a mile would the extra money build?

Borrowing and Lending Money



Mr. White had saved $10,000 in order that he might build a house on a lot that he owned. As he planned the house, he thought it would cost exactly $10,000. But when the house was nearly completed, he discovered that the cost of the house would be $12,000 instead of $10,000. Therefore, he went to the bank and asked the bank to lend him $2000 for a year, because he could save $2000 during the next year and pay it back to the bank. The cashier of the bank was glad to lend $2000 to Mr. White, but he told Mr. White that 6% interest must be paid and a note for the $2000 signed. This seemed fair to Mr. White; so he signed a piece of paper like this:


$2000.00 Indianapolis, Ind., Aug. 15, 1927

One year after date I promise to pay to the order of The Farmer's State Bank

Two thousand and no/100 Dollars

at The Farmer's State Bank

Value received with interest at 6% per annum

No. 426 Due Aug. 15, 1928 Robert W. White

You can see that the slip Mr. White signed was a promise to pay the bank $2000 one year from the date the paper was signed. This kind of promise made by a person who is borrowing money is called a **promissory note.**

Mr. White also promised to pay interest on the $2000 he borrowed.

Interest is money paid for the use of money. It was a great convenience to Mr. White to get $2000

from the bank for a year, and the bank was entitled to payment for lending its money. That is why Mr. White agreed to pay the bank 6% of the $2000 for the use of the money for a year. The per cent of interest paid is called the **rate of interest.** You see on August 15, 1928, Mr. White had to pay the bank not only the $2000 he had borrowed, but also 6% of $2000, or $120 interest. Notice that Mr. White promised to pay 6% "per annum." **Per annum** means yearly, or per year, or by the year.

The amount of money that is borrowed is called the **principal.** The length of time for which interest is paid is called the **term,** or **time.**

> The **principal** is the amount borrowed.
> The **per cent** is the rate of interest.
> The **term** is the length of time.

Sometimes a man or business firm wants to borrow a large sum of money, perhaps $100,000. In such a case the bank that lends the money might require the person or firm borrowing the money to give a mortgage on some property that the borrower owns. A **mortgage** is a promise made by a person or business firm that borrows money to give the person or bank that lends the money some property if the money borrowed and interest due is not paid at the time promised.

Sometimes when villages, cities, counties, states, or governments borrow money, they sell their promises to pay. Promises of this kind are called **bonds.** You will learn more about mortgages and bonds in the seventh and eighth grades.

Practice in Finding Interest

Find the interest for one year on each of the following amounts at the rates indicated. The interest on \$5000 at 4% is \$5000 × .04, or \$200.

	1.	2.
(A)	\$500 at 3%	\$750 at 5%
(B)	\$750 at 6%	\$1000 at 4%
(C)	\$1500 at 4%	\$25 at 8%
(D)	\$20,000 at 5%	\$2500 at 7%
(E)	\$244 at 6%	\$50 at 5%

More Practice in Finding Interest

Money is often borrowed for 30 days, 60 days, 90 days, 6 months, or one year. In finding interest, 360 days are considered a year.

The most common rates of interest charged are 3%, 4%, $4\frac{1}{2}$%, 5%, $5\frac{1}{2}$%, 6%, $6\frac{1}{2}$%, 7%, $7\frac{1}{2}$%, and 8%.

Remember, in business:

30 da. = 1 mo. or $\frac{1}{12}$ yr.
60 da. = 2 mo. or $\frac{1}{6}$ yr.
45 da. = $1\frac{1}{2}$ mo. or $\frac{1}{8}$ yr.
90 da. = 3 mo. or $\frac{1}{4}$ yr.
120 da. = 4 mo. or $\frac{1}{3}$ yr.
180 da. = 6 mo. or $\frac{1}{2}$ yr.
240 da. = 8 mo. or $\frac{2}{3}$ yr.
360 da. = 12 mo. or 1 yr.

Find the interest on the following principals at the rates and times given. Here is an example worked for

you so that you will know how to do the examples in this lesson.

Find the interest on \$600 at 6% for 45 days.

The interest on \$600 at 6% for one year is \$600 × .06, or \$36. 45 days is $\frac{1}{8}$ of a year. Then, the interest on \$600 for 45 days is $\frac{1}{8}$ of \$36 = $\frac{\$9}{2}$ = \$4.50.

1. \$400 at 3% for 180 days
2. \$500 at 8% for 30 days
3. \$1000 at 4% for 240 days
4. \$40 at 6% for 60 days
5. \$120 at $3\frac{1}{2}$% for 120 days
6. \$300 at $6\frac{1}{2}$% for 45 days
7. \$3000 at $6\frac{1}{2}$% for 90 days
8. \$30 at $4\frac{1}{2}$% for 360 days
9. \$175 at 8% for 45 days
10. \$75 at 7% for 240 days
11. \$100 at 5% for 60 days
12. \$10 at 6% for 120 days
13. \$200 at $3\frac{1}{2}$% for 120 days
14. \$10,000 at 6% for 30 days
15. \$500 at 6% for 90 days
16. \$857 at 6% for 180 days

Interest on Savings Accounts

You have just learned that people who borrow money from a bank pay interest on the money they borrow. But if you save money and leave it in the bank, the bank will pay interest to you. When a person leaves money in the bank to draw interest, he has a savings account. Nearly all banks have savings

account departments. It is an excellent plan for a person to have a savings account and to deposit money in it from time to time. Boys and girls, as well as men and women, should have savings accounts.

Banks usually pay 3%, $3\frac{1}{2}$%, or 4% on savings accounts. In many banks interest is paid on all deposits of one dollar or more at the beginning of every month. Jack Brown had a savings account on which he received 4% interest. The amounts on which Jack received interest, with the time for which 4% interest was paid between January 1 and July 1, were as follows:

Jan. 1, Jack deposited \$25, on which he received interest for 6 months.
Feb. 1, he deposited \$4.00, on which he received interest for 5 months.
Mar. 1, he deposited \$3.50, on which he received interest for 4 months.
Apr. 1, he deposited \$1.25, on which he received interest for 3 months.
May 1, he deposited \$2.85, on which he received interest for 2 months.
June 1, he deposited \$8.00 on which he received interest for 1 month.

Remember:

6 mo. $= \frac{1}{2}$ yr.	3 mo. $= \frac{1}{4}$ yr.
5 mo. $= \frac{5}{12}$ yr.	2 mo. $= \frac{1}{6}$ yr.
4 mo. $= \frac{1}{3}$ yr.	1 mo. $= \frac{1}{12}$ yr.

1. How much interest did Jack receive on the \$25?
2. How much interest did he receive on the \$4.00?
3. How much interest did he receive on the \$3.50?

4. How much interest did he receive on the $1.25?
5. How much interest did he receive on the $2.85?
6. How much interest did he receive on the $8.00?
7. How much interest did Jack receive all together?

Practice in Dividing Denominate Numbers

Copy and work these examples:

	1.	2.	3.
(A)	5)5 lb. 10 oz.	2)18 qt. 0 pt.	6)72 min. 24 sec.
(B)	3)15 gal. 3 qt.	8)45 yd. 1 ft.	3)9 ft. 6 in.
(C)	5)42 qt. 1 pt.	2)68 yd. 2 ft.	5)125 hr. 35 min.
(D)	2)36 bu. 2 pk.	3)37 min. 9 sec.	4)9 lb. 4 oz.
(E)	4)18 ft. 4 in.	5)17 gal. 2 qt.	3)98 hr. 15 min.

Finding Interest for Odd Lengths of Time Less than a Year

Sometimes interest is not paid for an even number of days, such as 30 days, 60 days, 90 days, 6 months, or 1 year. Consequently interest has to be figured for other periods of time than those given above. Here are some interest examples in which interest is paid for odd lengths of time.

Find the interest on $600 at 6% for 93 days.

The interest on $600 at 6% for one year is $600 × .06, or $36. Ninety days is $\frac{1}{4}$ of one year; so the interest on $600 for 90 days is $\frac{1}{4}$ of $36 = $9.00. Now

3 days is $\frac{3}{360}$ of one year; so the interest for 3 days is $\frac{3}{360}$ of $\$36.00 = \$.10$. Then, the interest on \$600 for 93 days at 6% is:

\$9.00 interest for 90 da.
.30 interest for 3 da.
\$9.30 interest for 93 da.

Find the interest on:

1. \$500 at 4% for 75 days
2. \$800 at 5% for 47 days
3. \$6000 at 6% for 185 days
4. \$5000 at 7% for 15 days
5. \$8000 at 8% for 10 days
6. \$2500 at 6% for 11 days
7. \$1500 at 4% for 16 days
8. \$4000 at 6% for 31 days
9. \$400 at 3% for 25 days
10. \$250 at 5% for 28 days

Finding Interest for Lengths of Time over a Year

Sometimes money is borrowed for more than a year. It is therefore necessary to know how to find interest for periods of time longer than a year.

Find the interest on \$600 at 6% for 2 years, 6 months.

\$600
.06
\$36.00 interest on \$600 at 6% for 1 yr.
2
\$72.00 interest on \$600 at 6% for 2 yr.

Six months is $\frac{1}{2}$ year. The interest on \$600 for $\frac{1}{2}$ year at 6% is $\frac{1}{2}$ of \$36.00 = \$18.

Then, the interest on \$600 at 6% for 2 years, 6 months is:

\$72.00 interest on \$600 at 6% for 2 yr.
18.00 interest on \$600 at 6% for 6 mo.
\$90.00 interest on \$600 at 6% for 2 yr. 6 mo.

Find the interest on the following amounts at the rates and times indicated:

1. \$1000 at 6% for 2 yr. 3 mo.
2. \$200 at 4% for 1 yr. 9 mo.
3. \$3000 at 8% for 3 yr. 4 mo.
4. \$25,000 at 5% for 5 yr. 6 mo.
5. \$400 at 3% for 1 yr. 8 mo.
6. \$600 at 4% for 2 yr. 1 mo.
7. \$800 at 3% for 3 yr. 5 mo.
8. \$10,000 at 6% for 1 yr. 6 mo.
9. \$12,000 at 5% for 5 yr. 7 mo.
10. \$120 at 8% for 1 yr. 1 mo.

Chapter Review

On page 374 is a review of what you have studied in this chapter. Write the numbers 1 to 12 on a sheet of paper. After each number you have written, write the answer to the question that has the same number.

At the end of each question you will see a page number. If you missed any part of the test, turn back to the page number given after that part of the test, where you will find how to answer what you missed. Study what you missed until you are sure you know

what to do. Then go back to the chapter review and again try the part you missed. Do this until you do not miss anything or until your teacher tells you to work on something else.

1. What is interest? (Page 367)

2. On March 2, 1928, Mr. J. W. Roberts borrowed $500 from the American Trust Bank, Rochester, New York, for 4 months at $5\frac{1}{2}\%$. Write a copy of the note Mr. Roberts signed. (Page 366)

3. How much money would Mr. Roberts have to pay back? (Page 367)

4. What is a savings account? (Page 369)

5. How does a savings account differ from a checking account? (Page 369)

6. What is the name given to the amount of money borrowed? (Page 367)

7. On July 1 Henry White deposited $60 in a savings account. On October 1 he deposited $35 more. If the bank paid him 4% interest on his deposits, how much interest was due on January 1 following? (Page 370)

8. What is a budget? (Page 361)

9. If you buy a bill of goods at the grocery store, the clerk makes out a sales slip. Tell what information a sales slip gives. (Page 354)

10. What is a mortgage? (Page 367)

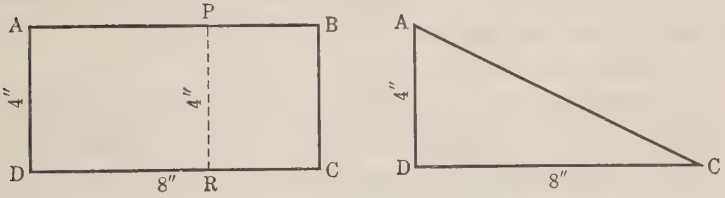
11. What is a promissory note? (Page 366)

12. Make what you think would be a good budget for an allowance for yourself of $1.00 a week. (Page 363)

CHAPTER XX

Finding the Areas of Triangles and Parallelograms and the Volumes of Rectangular Figures

Finding the Area of a Right Triangle



How do you find the area of a rectangle?

You know that the area of a rectangle is equal to the length multiplied by the width; so the area of rectangle (or □) *ABCD*, which is 8″ by 4″, is 32 square inches.

What is the base of □ *ABCD*? What is the altitude of □ *ABCD*? (If you have forgotten what the base and altitude of a parallelogram are, look them up on page 344.) Yes, *PR* is the altitude of □ *ABCD*. But either *AD* or *BC* may also be taken as the altitude of □ *ABCD*, because both *AD* and *BC*, as well as *PR*, are lines drawn from one side perpendicular to the the base of the parallelogram. (If you have forgotten what perpendicular means, look it up on page 344.) But *AD* and *BC* are sides of □ *ABCD*. One side of a rectangle is always the altitude. Also, one side

of a rectangle is always the base. So, instead of saying the area of a rectangle is equal to the length times the width, we may say:

> The area of a rectangle is equal to the base times the altitude.
>
> Area of a rectangle = base × altitude

Then the area of rectangle $ABCD$ equals as many square inches as the base times the altitude, or 8×4, or 32 square inches.

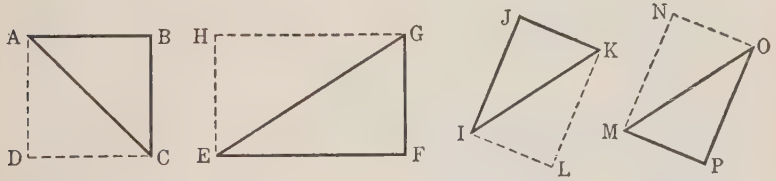
How does the rt. $\triangle ADC$ compare with rectangle $ABCD$ in size? (This is another way of asking which one is larger and how much larger.)

You see, rectangle $ABCD$ is twice as large as rt. $\triangle ADC$, or $\triangle ADC$ is only one-half as large as rectangle $ABCD$. So the area of rt. $\triangle ADC$ is half the area of rectangle $ABCD$. Then, the area of rt. $\triangle ADC$ is equal to the base of rt. $\triangle ADC$ times the altitude of rt. $\triangle ADC$ divided by 2.

You know that the side of a right triangle opposite the right angle is called the hypotenuse. You also know that the side of a triangle on which the triangle stands or rests is called the base. You likewise know that a line drawn from the vertex of the angle opposite the base of a triangle perpendicular to the base of the triangle is the altitude of the triangle. Then, what is the hypotenuse of rt. $\triangle ADC$? What is the base of rt. $\triangle ADC$? What is the altitude of rt. $\triangle ADC$? Then, how can you find the area of rt. $\triangle ADC$? Yes, the area of rt. $\triangle ADC$ is equal to $\frac{1}{2}$ of 32 square inches,

or 16 square inches. A shorter way of writing and working this would be $\frac{8 \times \cancel{4}^{2}}{\cancel{2}} = 16$. Then, the area of $\triangle ADC$ is 16 square inches. This is just half as much as the area of rectangle $ABCD$.

Now see if you can make a rule for finding the area of any right triangle.



How does rt. $\triangle ABC$ compare in size with $\square ABCD$?
How does rt. $\triangle EFG$ compare in size with $\square EFGH$?
How does rt. $\triangle IJK$ compare in size with $\square IJKL$?
How does rt. $\triangle MPO$ compare in size with $\square MPON$?

From this, you see that any right triangle is always half of some rectangle; so the area of a right triangle is always half the area of some rectangle.

In finding the area of a right triangle, take the two shorter sides as the base and altitude. Take the side on which the triangle rests as the base and the shorter of the other two sides as the altitude. Read the bases and the altitudes in the rt. $\triangle ABC$, EFG, IJK, and MPO.

> The area of a right triangle is equal to $\frac{1}{2}$ the base times the altitude.
>
> Area of a right triangle $= \frac{1}{2}$ base $\times$ altitude

Practice in Finding Areas of Right Triangles

Find the areas of right triangles that have the following dimensions. Write only the answers. Remember areas must be in terms of square units.

1. Base 3′, altitude 4′
2. Base 2″, altitude 5″
3. Base 3″, altitude 6″
4. Base 4′, altitude 5′
5. Base 2′, altitude 7′
6. Base 4 yd., altitude 9 yd.
7. Base 5′, altitude 8′
8. Base 6″, altitude 9″
9. Base 7″, altitude 8″
10. Base 3 yd., altitude 8 yd.

General Practice 39

Work these examples and problems. Time, 15 minutes.

1.	2.	3.	4.
Divide:	Add:	Multiply:	Divide:
	475	.075	
$29\overline{)14{,}558}$	29	6.2	$5\overline{)38 \text{ lb. } 7 \text{ oz.}}$
	683		
	4125		
	78		
	473		
	69		
	824		
	735		
	916		
	52		

5.	6.	7.	8.
Reduce:	Multiply:	Subtract:	Change to
18 ft. 7 in. = _?_ in.	$3\frac{1}{7} \times 2\frac{2}{5}$	$58\frac{1}{3}$	a decimal:
		$26\frac{5}{8}$	$\frac{29}{32}$

9. The average yield of Burley tobacco in Kentucky is 900 pounds to the acre. Under good farm practice, the yield may be increased to 1200 pounds to the acre. If the quality of these two yields were the same, what would be the difference in value on a 5-acre crop when tobacco sells at 22¢ a pound?

10. If 1 inch on a road map stands for 25 miles, how many miles apart are two places that are $2\frac{1}{4}$ inches apart on the map?

11. Henry's father raised 1465 bushels of wheat, and Fred's father raised 1758 bushels of wheat. Henry thinks that 1758 bushels is 20% more than 1465 bushels. See if Henry is right.

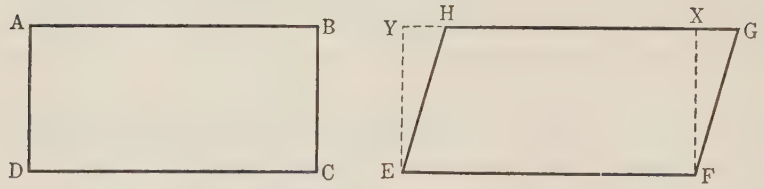
12. In problem 11, above, Fred thinks that 1465 bushels is $16\frac{2}{3}\%$ less than 1758 bushels. Is Fred right?

13. It is 79.4 miles from Milwaukee, Wisconsin, to Chicago, Illinois. If a passenger train takes 1 hour, 45 minutes to make the trip, how many miles per hour does it average? (Use decimals and work to the nearest tenth of a mile.)

14. Tom weighs $58\frac{5}{8}$ pounds, and Jack weighs $72\frac{11}{16}$ pounds. If they were both to get on the scale at the same time, what total weight would the scale show?

15. Edna had a calf which she showed at the state fair. When it was sold to the highest bidder at auction there, it brought $90. The calf weighed 643 pounds. How much per pound did it bring?

Finding the Area of a Parallelogram



What kind of figure is figure *ABCD*? How long is rectangle *ABCD*? How wide is rectangle *ABCD*?

What kind of lines are lines *EH* and *GF*? What kind of lines are lines *HG* and *EF*? What kind of figure is figure *EFGH*? (If you are not sure what kind of lines these are, or the name of figures like *EFGH*, look them up on page 336.)

What line is an altitude of $\square$ *EFGH*? What kind of figure is figure *XGF*? What kind of figure is figure *EYH*? How do the two triangles, *XGF* and *EYH*, compare in size?

From this, you see that the area of $\triangle$ *XGF* is the same as the area of $\triangle$ *EYH*.

What kind of figure is figure *EFXY*? What is the base of $\square$ *EFXY*? What is the altitude of $\square$ *EFXY*? Then, what is the area of $\square$ *EFXY*?

Which do you think has the larger area, $\square$ *EFXY* or $\square$ *EFGH*?

Do you see that, if $\triangle$ *XGF* were cut off $\square$ *EFGH* and if the side of the triangle marked *FG* were laid on *EH*, you would have $\square$ *EFXY*? From this, you see the area of $\square$ *EFGH* is the same as the area of $\square$ *EFXY*.

But the area of a rectangle is equal to the base times the altitude.

The area of a parallelogram is equal to the base times the altitude.

Area of a parallelogram = base × altitude

Practice in Finding the Areas of Parallelograms

Find the areas of parallelograms having the following dimensions. Write only the answers. Remember areas must be in terms of square units.

1. Base 4″, altitude 2″
2. Base 5′, altitude 3′
3. Base 7′, altitude 6′
4. Base 8′, altitude 5′
5. Base 3 yd., altitude 2 yd.
6. Base 12″, altitude 8″
7. Base 9′, altitude 5′
8. Base 6 yd., altitude 4 yd.
9. Base 7″, altitude 3″
10. Base 5′, altitude 4′

Practice in Dividing Denominate Numbers

Copy and work these examples:

	1.	2.
(A)	$7\overline{)17 \text{ ft. } 6 \text{ in.}}$	$9\overline{)20 \text{ bu. } 1 \text{ pk.}}$
(B)	$3\overline{)7 \text{ lb. } 8 \text{ oz.}}$	$13\overline{)117 \text{ min. } 39 \text{ sec.}}$
(C)	$53\overline{)344 \text{ qt. } 1 \text{ pt.}}$	$2\overline{)28 \text{ yd. } 2 \text{ ft.}}$
(D)	$3\overline{)27 \text{ hr. } 48 \text{ min.}}$	$7\overline{)89 \text{ gal. } 1 \text{ qt.}}$

General Practice 40

Work these examples and problems. Time, 15 minutes.

1. Reduce:

(*a*) 9 ft. 5 in. = _?_ in.

(*b*) 437 oz. = _?_ lb. _?_ oz.

2. Add:

6.4
70.
2.93
187.
52.7
6.93
8.04

3. Reduce to lowest terms: $\frac{54}{72}$

4. Subtract:

$29.4\frac{1}{3}$
$6.2\frac{5}{6}$

5. Multiply: $8\frac{1}{3}$ by $8\frac{3}{4}$

6. Divide to 3 places: $.032\overline{)\$138}$

7. Add:

5 lb. 10 oz.
1 lb. 7 oz.
6 lb. 2 oz.
15 oz.

8. Divide to 3 places: $128\overline{)35}$

9. There are 231 cubic inches in a gallon. How many gallons of water can be put into a glass aquarium the inside measurements of which are 8 inches by 8 inches by 15 inches? (Find the answer to the nearest tenth of a gallon.)

10. Which has the greater perimeter, a house that is $40' \times 40'$ or one that is $20' \times 80'$? How much greater? Will they both have the same floor space?

11. Which would you rather have, $\frac{1}{6}$ off on a bill of \$4.20 or 20% off on the same bill? How much more would you save by choosing the larger discount?

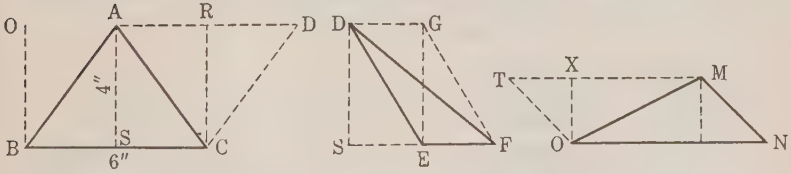
12. Which is better, and how much, to buy tomatoes at \$5.76 a case of 24 cans, less $16\frac{2}{3}\%$, or to pay 21¢ a can for 24 cans, bought one at a time?

13. Mr. Lewis gets 35¢ apiece for his melons. He wants to buy 5 sacks of flour at \$2.45 a sack. How many melons must he sell to get enough money to pay for the flour?

14. When Mr. Gibson and his family started on a vacation trip, their speedometer registered 7453 miles. At the end of the first day it registered 7724 miles. Mr. Gibson said they were on the road exactly 8 hours. What was the average number of miles per hour, correct to the nearest tenth of a mile?

15. If 30 rods of tiling will drain an acre of land, how many rods will be required for $6\frac{3}{5}$ acres?

Finding the Area of Any Triangle



What kind of figure is figure *ABCD*? How do you find the area of a parallelogram? What is the base of $\square\ ABCD$? What is the altitude of $\square\ ABCD$? Then, the area of $\square\ ABCD$, which is 6″ by 4″, is 24 square inches.

How does $\triangle\ ABC$ compare in size with $\triangle\ ACD$? You see $\triangle\ ABC$ is half of $\square\ ABCD$. You know that the area of $\square\ ABCD$ is 24 square inches. The area of $\triangle\ ABC$ is one-half the area of $\square\ ABCD$, or 24

square inches divided by 2, or 12 square inches. What is the area of $\triangle DEF$? What is the area of $\triangle MON$?

See if you can make a rule for finding the area of any triangle. Just as a right triangle is always half of some rectangle, so any triangle is always half of some parallelogram.

The area of any triangle equals the base times the altitude divided by 2.

$$\text{Area of a triangle} = \frac{\text{base} \times \text{altitude}}{2}$$

Practice in Finding the Areas of Triangles

Find the areas of triangles having the following dimensions. Write only the answers. Remember areas must be in terms of square units.

1. Base 3″, altitude 2″
2. Base 5′, altitude 4′
3. Base 7″, altitude 5″
4. Base 8 yd., altitude 4 yd.
5. Base 6′, altitude 7′
6. Base 9 yd., altitude 4 yd.
7. Base 6″, altitude 3″
8. Base 7′, altitude 8′
9. Base 10″, altitude 7″
10. Base 4′, altitude 3′
11. Base 5′, altitude 8′
12. Base 12″, altitude 8″
13. Base 160 rd., altitude 80 rd.

General Practice 41

Work these examples and problems. Time, 15 minutes.

1. Reduce:

(*a*) 3 mi. 225 rd. = _?_ rd.

(*b*) 425 oz. = _?_ lb. _?_ oz.

(*c*) 316 in. = _?_ ft. _?_ in.

2. Add:

$\frac{5}{8}$
$\frac{11}{12}$
$\frac{1}{3}$
$\frac{2}{5}$
$\frac{1}{6}$

3. Change to a decimal:

$\frac{37}{64}$

4. Multiply:

$39.85
1.07

5. Divide:

.32)$18

6. Add:

$29\frac{1}{3}$
$7\frac{5}{6}$
$4\frac{11}{12}$
$\frac{2}{3}$

7. Add:

7 lb. 3 oz.
2 lb. 1 oz.
6 lb. 15 oz.
12 oz.

8. Subtract 5 dollars, 18 cents from 9 dollars, 7 cents.

9. In running a mile race, George made the distance in 6 minutes flat, and Charles made the distance in 5 minutes, 47 seconds. By how many seconds did Charles beat George?

10. The distance from New York City to Chicago, Illinois, is 908 miles. The distance from Chicago to San Diego, California, is 2354 miles. What part of the entire distance from New York to San Diego have you traveled when you have reached Chicago?

11. Tom's father runs a restaurant. One day he

bought 12 chickens that weighed 51 pounds all together. What was the average weight of the chickens?

12. John wishes to buy a bicycle from his earnings on a paper route. A bicycle like the one he wants will cost \$42.50. John has \$7.50 now, and he thinks he can save \$1.75 a week. If he does save an average of \$1.75 a week, in how many weeks can he purchase the bicycle?

13. Jane's father runs a clothing store. He bought a half dozen men's suits for \$150, less 20% discount. If he marked these suits to sell at \$28.50 each, how much did he mark each suit above cost?

14. On July 1, William started a savings account at the bank by depositing \$15. August 1, he deposited \$8; September 1, he deposited \$6; October 1, he deposited \$10; December 1, he deposited \$12; December 20, he drew out \$15. If the bank gave William 26¢ for the interest on his deposits, how much did he have in his savings account on January 1?

15. Henry's uncle runs a grocery store. Last year the total expense for running the store was 23.4% of his sales; two years ago it was 24.9%; three years ago it was 22.8%; four years ago it was 25.6%; and five years ago it was 27.8%. What was the average for the last 5 years?

Review of Finding Volumes

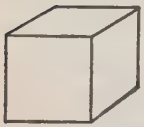


Figure A
Scale: $\frac{7}{16}$ in. = 1 in.

A block of wood 1 inch wide, 1 inch long, and 1 inch high is called a cubic inch of wood. It is also called a rectangular solid, you remember, because each side of the cube is a rectangle.

If you place six cubic inches together so that there are 2 rows of cubic inches with 3 cubic inches in each row, you will have a rectangular solid which looks like figure B.

Figure B

Scale: $\frac{5}{16}$ in. = 1 in.

Do you see that figure B, which is 2 inches wide, 3 inches long, and 1 inch high contains 6 cubic inches? Or $2 \times 3 \times 1 = 6$. Since there are three dimensions, the unit is cubic, and the figure contains 6 cubic inches.

Now suppose you place six more cubic inches on top of the first figure. How many cubic inches are there in the figure now? Then, 2×6 cubic inches = 12 cubic inches, and figure C contains 12 cubic inches.

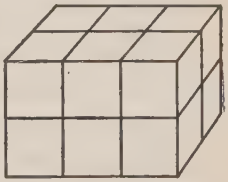
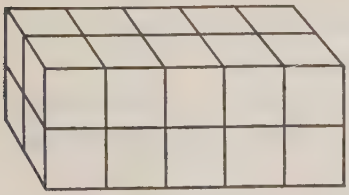


Figure C

Scale: $\frac{5}{16}$ in. = 1 in.

A rectangular solid 1 foot long, 1 foot wide, and 1 foot high is called a **cubic foot.**

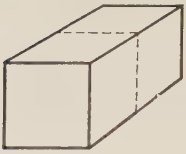


Scale: $\frac{5}{16}$ in. = 1 in.

Can you tell how many cubic feet there are in a chest 5 feet long, 2 feet wide, and 2 feet high?

Did you get 20 cubic feet?

A rectangular solid 1 yard long, 1 yard wide, and 1 yard high is called a **cubic yard.**



Scale: $\frac{7}{16}$ in. = 1 yd.

How many cubic yards are there in a water tank 2 yards long, 1 yard wide, and 1 yard high?

> The volume of a rectangular solid is equal to the product of the numbers representing its length and width and height. All the dimensions must be in the same unit of linear measure, and the volume of anything is always in cubic units, such as cubic inches, cubic feet, and cubic yards.

Problems

1. How many cubic feet of water are there in a tank the inside of which is 20 feet long, 12 feet wide, and 6 feet deep?

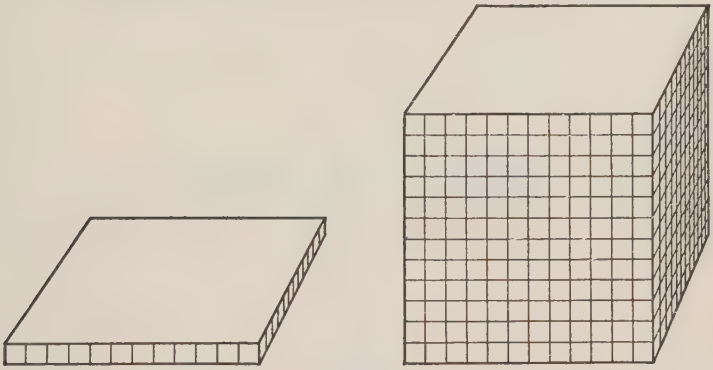
2. The inside of the drawer in John's desk is 12 inches long, 8 inches wide, and 4 inches deep. How many cubic inches does it contain?

3. The inside of Mary's cedar chest is 4 feet long, $1\frac{3}{4}$ feet wide, and $1\frac{1}{2}$ feet high. How many cubic feet does it contain?

4. A room is 5 yards long, 4 yards wide, and 3 yards high. What is its volume in cubic yards?

5. The inside of a box is 4 inches wide, 4 inches high, and 9 inches long. How many cubic-inch blocks of wood will it hold?

Changing Cubic Inches to Cubic Feet



Scale: $1\frac{5}{16}$ in. = 1 ft.

A rectangular solid 1 foot long and 1 foot wide made up of cubic inches would equal 12 rows of 12 cubic inches, or 12 × 12 cubic inches, which is 144 cubic inches.

If 12 layers of 144 cubic inches each are placed one on top of another, there will be 12 × 144 cubic inches, or 1728 cubic inches.

1 cubic foot = 1728 cubic inches

How many cubic feet are there in a box the inside of which is 18 inches long, 14 inches wide, and 16 inches high?

There are two good methods by which you can solve this problem.

First Method: 18 × 16 × 14 = 4032. The volume of the box is 4032 cubic inches.

Then, since 1728 cubic inches = 1 cubic foot, 4032 cubic inches ÷ 1728 cubic inches = $2\frac{1}{3}$. Then, the volume of the box is $2\frac{1}{3}$ cubic feet.

Second Method: Since 1728, the number of cubic inches in 1 cubic foot, is equal to $12 \times 12 \times 12$, it is sometimes easier to divide by $12 \times 12 \times 12$ and cancel.

$$\frac{\cancel{18}^{3} \times \cancel{16}^{4} \times \cancel{14}^{7}}{\cancel{12} \times \cancel{12} \times \cancel{12}} = \frac{7}{3} = 2\tfrac{1}{3}$$

Problems

1. How many cubic feet are there in a suit case the inside of which is 24 inches long, 16 inches wide, and 8 inches deep?

2. How many cubic feet are there in a drawer the inside of which is 18 inches wide, 18 inches long, and 6 inches deep?

3. What is the volume in cubic inches of a piece of ice $1\frac{1}{2}$ feet long, 1 foot wide, and $\frac{3}{4}$ foot thick?

4. How many cubic feet of water can be put into an aquarium the inside measurements of which are 27 inches by 24 inches by 18 inches?

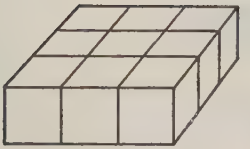
5. How many gallons of water can be put into a tank the inside of which is $16'' \times 12'' \times 8''$? (1 gal. = 231 cu. in.)

Practice in Dividing Decimals

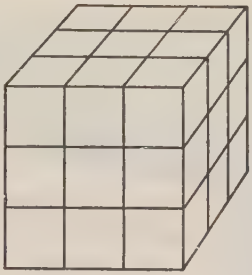
Copy and divide these numbers:

	1.	2.	3.	4.
(A)	$.2\overline{)135}$	$.25\overline{)1275}$	$5\overline{).9}$	$.123\overline{)615}$
(B)	$.6\overline{).9}$	$15\overline{).18}$	$.13\overline{).117}$	$.005\overline{).4}$

Changing Cubic Feet to Cubic Yards



Scale: $\frac{7}{8}$ in. = 1 yd.



Scale: $\frac{15}{16}$ in. = 1 yd.

A rectangular solid 1 yard long and 1 yard wide made up of cubic feet would contain 9 cubic feet. If 3 layers of 9 cubic feet each are piled on one another, there will be 3×9 cubic feet, or 27 cubic feet.

1 cubic yard = 27 cubic feet

How many cubic yards are there in a room 15 feet by 12 feet by 9 feet?

There are two good methods of working this problem.

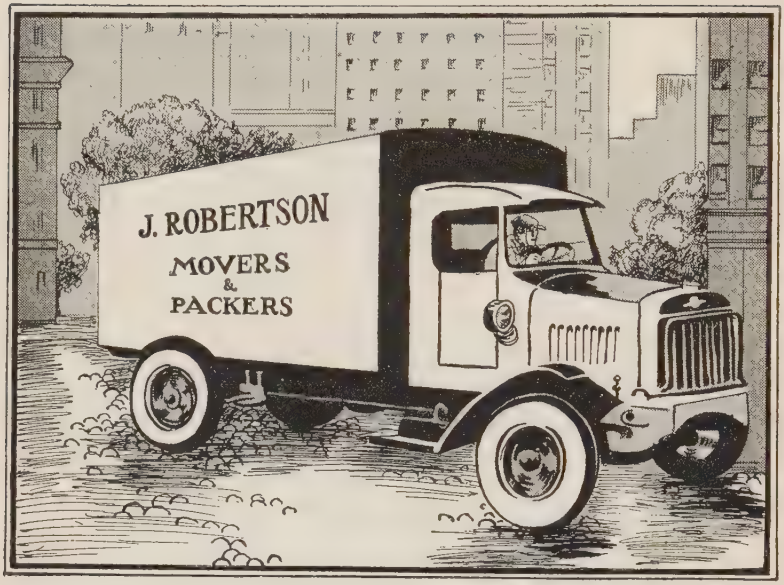
First Method: $15 \times 12 \times 9 = 1620$. The volume of the room is 1620 cubic feet. 1620 cu. ft. $\div$ 27 cu. ft. = 60. Then, the volume of the room is 60 cubic yards.

Second Method:

$$\frac{\overset{5}{\cancel{15}} \times \overset{4}{\cancel{12}} \times \overset{3}{\cancel{9}}}{\underset{1}{\cancel{3}} \times \underset{1}{\cancel{3}} \times \underset{1}{\cancel{3}}} = 60$$

Then, there are 60 cubic yards in the room.

Problems



1. A truck has a capacity of 4 cubic yards. How many cubic feet does it hold?

2. How many cubic yards of dirt must be removed in making an excavation 30 feet long, 27 feet wide, and 8 feet deep?

3. The excavation for an office building is $100' \times 75' \times 18'$. The dirt is hauled away in trucks holding 2 cubic yards of dirt. How many trips are necessary? If 10 trucks are used, how many trips does each truck make?

4. If a freight car 8 ft. 4 in. by 7 ft. 6 in. by 36 ft. is $\frac{3}{4}$ full of wheat, how many cubic feet of wheat are there in the car?

5. One bushel of wheat occupies $1\frac{1}{4}$ cubic feet of space. How many bushels of wheat are there in the car described in problem 4?

Chapter Review

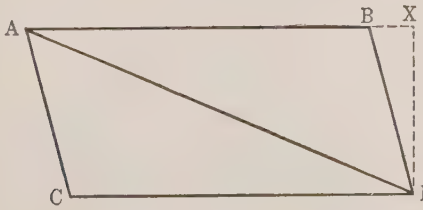
Here is a review of what you have studied in this chapter. Write the numbers 1 to 10 on a sheet of paper. After each number you have written, write the answer to the question that has the same number.

At the end of each question you will see a page number. If you missed any part of the test, turn back to the page number given after that part of the test, where you will find how to answer what you missed. Study what you missed until you are sure you know what to do. Then go back to the chapter review and again try the part you missed. Do this until you do not miss anything or until your teacher tells you to work on something else.

1. How do you find the area of a rectangle? (Page 376)

2. The base of a right triangle is 4 inches, and the altitude is 6 inches. What is the area of the triangle? (Page 377)

3. Find the area of this parallelogram:



(Page 380)

4. What is the area of triangle BAD, shown in the figure on page 393? (Page 384)

5. What are the dimensions of a block of wood containing a cubic foot if the sides of the block are squares? (Page 387)

6. How do you find the area of a triangle? (Page 383)

7. How many cubic inches are there in a cubic foot? (Page 389)

8. Mr. Rollins is building a new house. If a space $32' \times 40' \times 12'$ is to be excavated for the basement, how many cubic yards of dirt must be dug out? (Page 391)

9. How many cubic inches are there in a block 2 feet long, $1\frac{1}{2}$ feet wide, and 1 foot high? (Page 389)

10. How do you find the area of a parallelogram? (Page 380)

TABLES

Length

12 inches (in.)				= 1 foot (ft.)
3 feet				= 1 yard (yd.)
$16\frac{1}{2}$ feet	= $5\frac{1}{2}$ yards			= 1 rod (rd.)
5280 feet	= 1760 yards	=	320 rods	= 1 mile (mi.)

Area

144 square inches (sq. in.)		= 1 square foot (sq. ft.)
9 square feet		= 1 square yard (sq. yd.)
$30\frac{1}{4}$ square yards		= 1 square rod (sq. rd.)
43,560 square feet	= 160 square rods	= 1 acre (A.)
640 acres		= 1 square mile (sq. mi.)

Cubic Measure

1728 cubic inches (cu. in.)	= 1 cubic foot (cu. ft.)
27 cubic feet	= 1 cubic yard (cu. yd.)

Weight

16 ounces (oz.)	= 1 pound (lb.)
100 pounds	= 1 hundredweight (cwt.)
2000 pounds	= 1 ton (T.)

Liquid Measure

4 gills (gi.)	= 1 pint (pt.)
2 pints	= 1 quart (qt.)
4 quarts	= 1 gallon (gal.)

Dry Measure

2 pints	= 1 quart
8 quarts	= 1 peck (pk.)
4 pecks	= 1 bushel (bu.)

Time

60 seconds (sec.)	= 1 minute (min.)
60 minutes	= 1 hour (hr.)
24 hours	= 1 day (da.)
7 days	= 1 week (wk.)
30 days	= 1 month (mo.) in business
12 months	= 1 year (yr.)
365 days	= 1 year
366 days	= 1 leap year
100 years	= 1 century

Other Useful Measures

1 bushel	= 2150.42 cubic inches or 1.244 cubic feet
1 cord of wood	= 128 cubic feet
1 cubic foot of water	= 7.489 gallons
1 cubic foot of water	= 62.5 pounds
1 gallon	= 231 cubic inches
1 bushel apples	= 48 pounds
1 bushel barley	= 48 pounds
1 bushel beans	= 60 pounds
1 bushel coal	= 80 pounds
1 bushel corn (shelled)	= 56 pounds
1 bushel corn (on ear)	= 70 pounds
1 bushel flaxseed	= 55 pounds
1 bushel lime	= 70 pounds
1 bushel oats	= 32 pounds
1 bushel onions	= 57 pounds
1 bushel peas	= 60 pounds
1 bushel potatoes	= 60 pounds
1 bushel rye	= 56 pounds
1 bushel wheat	= 60 pounds

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ANSWERS

PAGE 3. — **1A.** 14 **2A.** 16 **3A.** 89 **4A.** 82 **5A.** 100 **6A.** 26 **1B.** 297 **2B.** 79 **3B.** 957 **4B.** 97 **5B.** 221 **6B.** 735 **1C.** 79 **2C.** 90 **3C.** 79 **4C.** 108 **5C.** 356 **6C.** 748 **1D.** 652 **2D.** 898 **3D.** 810 **4D.** 2155 **5D.** 28,431 **6D.** 225,943

PAGE 4. — **1A.** 46 **2A.** 45 **3A.** 34 **4A.** 225 **5A.** 787 **6A.** 572 **1B.** 228 **2B.** 534 **3B.** 883 **4B.** 989 **5B.** 371 **6B.** 609 **1C.** 926 **2C.** 477 **3C.** 3597 **4C.** 1401 **5C.** 177 **6C.** 2683 **1D.** 6834 **2D.** 3269 **3D.** 4622 **4D.** 1096 **5D.** 5555 **6D.** 7600 **1E.** 6357 **2E.** 8149 **3E.** 2980 **4E.** 9479 **5E.** 1421 **6E.** 3115 **1F.** 4280 **2F.** 1206 **3F.** 5095 **4F.** 7683 **5F.** 34,992 **6F.** 688

PAGE 8. — Practice Test in Multiplication. **1A.** 68 **2A.** 207 **3A.** 264 **4A.** 657 **5A.** 959 **6A.** 5382 **1B.** 864 **2B.** 946 **3B.** 940 **4B.** 6992 **5B.** 8051 **6B.** 6526 **1C.** 13,696 **2C.** 30,316 **3C.** 125,400 **4C.** 296,400 **5C.** 159,600 **6C.** 242,421

Practice Test in Short Division. **1A.** 1,593,847 **2A.** 4766 **3A.** 77,954 **1B.** 188,856 **2B.** 1,050,406 **3B.** 309,534 **1C.** 394,553 **2C.** 828,035 **3C.** 119,775 **1D.** 4190 **2D.** 35,415 **3D.** 177,929 **1E.** 297,745 **2E.** 105,887 **3E.** 1,078,664 **1F.** 7,566,545 **2F.** 149,682 **3F.** 80,323

PAGE. 9 — **1A.** 4 **2A.** 2, R. 1 **3A.** 3 **4A.** 2, R. 22 **1B.** 8 **2B.** 3 **3B.** 7 **4B.** 3, R. 8 **1C.** 2, R. 12 **2C.** 4 **3C.** 68 **4C.** 96, R. 2 **1D.** 160 **2D.** 500 **3D.** 306 **4D.** 203

1. One quarter, one dollar, and one five-dollar bill **2.** 156 pounds **3.** $193 **4.** 33 hours, 32 minutes **5.** Yes

PAGE 10. — **1A.** 2 **2A.** 2, R. 13 **3A.** 4 **4A.** 8, R. 1 **1B.** 5, R. 2 **2B.** 9, R. 11 **3B.** 6, R. 24 **4B.** 24 **1C.** 20 **2C.** 50, R. 3 **3C.** 402 **4C.** 200, R. 24

PAGE 11. — **1A.** $ 316 **2A.** $868 **3A.** $21 **4A.** $3.07 **1B.** $1.75 **2B.** 7 **3B.** $11.68 **4B.** $24.22 **1C.** $109 **2C.** $18.75 **3C.** $31 **4C.** 96¢ **1D.** $17 **2D.** 5 **3D.** $11.00 **4D.** $.75

PAGE 16. — **1A.** $\frac{2}{3}$ **2A.** $\frac{2}{5}$ **3A.** $\frac{2}{9}$ **4A.** $\frac{3}{5}$ **5A.** $\frac{1}{15}$

1B. $\frac{3}{5}$ 2B. $\frac{5}{9}$ 3B. $\frac{7}{8}$ 4B. $\frac{5}{6}$ 5B. $\frac{3}{4}$ 1C. $\frac{9}{10}$ 2C. $\frac{11}{12}$
3C. $\frac{11}{16}$ 4C. $\frac{5}{7}$ 5C. $\frac{4}{5}$

1. $\frac{7}{8}$ acre 2. $\frac{1}{2}$ pound 3. $\frac{5}{7}$ 4. 1 mile 5. $\frac{15}{16}$ pound

PAGE 20. — 1. 2 2. 2 3. 3 4. 3 5. 3 6. 2 7. 6
8. 9 9. 2 10. 12 11. 6 12. 4 13. 9 14. 4 15. 3
16. 10 17. 6 18. 4 19. 6 20. 4 21. 6 22. 2
23. 10 24. 3 25. 2 26. 8 27. 3 28. 6 29. 8 30. 7
31. 4 32. 4 33. $\frac{5}{5}$ 34. $\frac{5}{5}$ 35. $\frac{4}{4}$ 36. $\frac{2}{2}$ 37. $\frac{3}{3}$
38. $\frac{3}{3}$

PAGE 21. — 1A. $\frac{3}{4}$ 2A. $\frac{3}{8}$ 3A. $\frac{7}{8}$ 4A. $\frac{5}{8}$ 5A. $\frac{7}{8}$ 6A. $\frac{5}{6}$
7A. $\frac{4}{9}$ 8A. $\frac{8}{9}$ 1B. $\frac{11}{10}$ 2B. $\frac{7}{12}$ 3B. $\frac{5}{14}$ 4B. $\frac{9}{16}$ 5B. $\frac{19}{21}$
6B. $\frac{7}{18}$ 7B. $\frac{11}{15}$ 8B. $\frac{23}{24}$

1. $\frac{4}{8}$, or $\frac{1}{2}$, of the patch 2. $\frac{3}{4}$ mile

PAGE 22. — 1. 8 2. 6 3. 10 4. 12 5. 20 6. 20
7. 5 8. 12 9. 4 10. 15 11. 18 12. 8 13. 12 14. 4
15. 10 16. 20 17. 15 18. 16 19. 15 20. 3 21. 6
22. 24 23. 9 24. 16 25. 6 26. 10 27. 6 28. 8 29. 5
30. 18 31. 8 32. 12 33. 5 34. 15 35. 12 36. 12 37. 14
38. 11 39. 15 40. 25 41. 16 42. 12 43. 18 44. 24

PAGE 23. — 1A. $\frac{16}{21}$ 2A. $\frac{5}{8}$ 3A. $\frac{5}{6}$ 4A. $\frac{7}{12}$ 5A. $\frac{9}{16}$
6A. $\frac{9}{14}$ 7A. $\frac{17}{20}$ 8A. $\frac{16}{21}$ 1B. $\frac{7}{8}$ 2B. $\frac{5}{6}$ 3B. $\frac{5}{12}$ 4B. $\frac{9}{16}$
5B. $\frac{19}{21}$ 6B. $\frac{8}{10}$, or $\frac{4}{5}$ 7B. $\frac{10}{24}$, or $\frac{5}{12}$ 8B. $\frac{11}{18}$

1. $\frac{5}{6}$ 2. $\frac{3}{8}$

PAGE 24. — 1. 6 2. 12 3. 15 4. 42 5. 70 6. 10
7. 24 8. 12 9. 12 10. 20 11. 30 12. 15 13. 6
14. 30 15. 30 16. 18 17. 30 18. 30 19. 14 20. 21
21. 40 22. 24 23. 10 24. 40 25. 24 26. 12 27. 24
28. 14 29. 21 30. 24 31. 70 32. 30 33. 18 34. 42
35. 60 36. 24

PAGE 25. — 1A. $\frac{5}{6}$ 2A. $\frac{7}{12}$ 3A. $\frac{11}{30}$ 4A. $\frac{13}{42}$ 5A. $\frac{7}{10}$
6A. $\frac{8}{15}$ 7A. $\frac{17}{30}$ 8A. $\frac{15}{56}$ 1B. $\frac{11}{18}$ 2B. $\frac{10}{21}$ 3B. $\frac{23}{30}$
4B. $\frac{23}{30}$ 5B. $\frac{9}{14}$ 6B. $\frac{11}{12}$ 7B. $\frac{12}{35}$ 8B. $\frac{13}{40}$ 1C. $\frac{17}{30}$
2C. $\frac{13}{15}$ 3C. $\frac{9}{20}$ 4C. $\frac{23}{40}$ 5C. $\frac{9}{10}$ 6C. $\frac{20}{21}$ 7C. $\frac{26}{35}$
8C. $\frac{33}{40}$ 1D. $\frac{11}{14}$ 2D. $\frac{9}{24}$, or $\frac{3}{8}$ 3D. $\frac{11}{28}$ 4D. $\frac{17}{70}$ 5D. $\frac{13}{18}$
6D. $\frac{17}{24}$ 7D. $\frac{27}{35}$ 8D. $\frac{31}{42}$

PAGE 27. — 1A. $\frac{2}{3}$ 2A. $\frac{1}{2}$ 3A. $\frac{2}{5}$ 4A. $\frac{1}{4}$ 5A. $\frac{1}{4}$ 6A. $\frac{1}{2}$
7A. $\frac{1}{8}$ 8A. $\frac{1}{3}$ 9A. $\frac{1}{3}$ 10A. $\frac{1}{3}$ 1B. $\frac{2}{3}$ 2B. $\frac{1}{2}$ 3B. $\frac{1}{6}$
4B. $\frac{2}{7}$ 5B. $\frac{1}{7}$ 6B. $\frac{1}{8}$ 7B. $\frac{1}{2}$ 8B. $\frac{1}{5}$ 9B. $\frac{1}{5}$ 10B. $\frac{3}{4}$

PAGE 29. — 1A. 2 2A. 8 3A. 5 4A. 1 5A. 9 6A. 3
7A 6 8A. 4 9A. 7 1B. 2 2B. 5 3B. 3 4B. 4
5B. 1 6B. 7 7B. 6 8B. 9 9B. 8 1C. 1 2C. 4

3C. 2 4C. 5 5C. 3 6C. 7 7C. 9 8C. 6 9C. 8
1D. 3 2D. 1 3D. 4 4D. 2 5D. 8 6D. 6 7D. 5
8D. 7 9D. 9 1E. 2 2E. 4 3E. 1 4E. 3 5E. 8
6E. 6 7E. 5 8E. 7 9E. 9 1F. 4 2F. 2 3F. 5
4F. 1 5F. 6 6F. 3 7F. 8 8F. 7 9F. 9 1G. 5
2G. 1 3G. 7 4G. 2 5G. 6 6G. 3 7G. 9 8G. 4
9G. 8 1H. 2 2H. 5 3H. 1 4H. 8 5H. 6 6H. 3
7H. 7 8H. 4 9H. 9

1. $\frac{13}{15}$ 2. $\frac{2}{7}$ 3. $\frac{15}{24}$ 4. $\frac{31}{42}$ 5. $\frac{17}{30}$ 6. $\frac{23}{24}$ 7. 7
8. $\frac{11}{18}$ 9. $\frac{2}{3}$ 10. $\frac{1}{4}$ 11. $\frac{3}{4}$ 12. $\frac{1}{3}$

Page 31. — 1. 35¢ 2. $3.15 3. $2.07 4. 6 months
5. 149 pounds

Page 32. — 1A. $\frac{1}{2}$ 2A. $\frac{1}{3}$ 3A. $\frac{1}{4}$ 4A. $\frac{1}{2}$ 5A. $\frac{3}{4}$ 6A. $\frac{2}{5}$
7A. $\frac{3}{4}$ 8A. $\frac{1}{2}$ 1B. $\frac{2}{3}$ 2B. $\frac{3}{7}$ 3B. $\frac{5}{8}$ 4B. $\frac{1}{5}$ 5B. $\frac{1}{3}$ 6B. $\frac{1}{3}$
7B. $\frac{3}{7}$ 8B. $\frac{1}{8}$

Page 33. — 1. $\frac{2}{3}$ 2. $\frac{3}{4}$ 3. $\frac{3}{4}$ mile
1A. $\frac{1}{7}$ 2A. $\frac{1}{2}$ 3A. $\frac{1}{3}$ 4A. $\frac{1}{4}$ 5A. $\frac{2}{3}$ 6A. $\frac{1}{3}$ 7A. $\frac{4}{5}$
8A. $\frac{1}{2}$ 1B. $\frac{2}{5}$ 2B. $\frac{1}{2}$ 3B. $\frac{1}{2}$ 4B. $\frac{1}{4}$ 5B. $\frac{5}{12}$ 6B. $\frac{10}{21}$
7B. $\frac{7}{24}$ 8B. $\frac{23}{24}$

Page 34. — 1. $\frac{5}{8}$ 2. $\frac{1}{3}$ 3. $\frac{1}{2}$ 4. $\frac{6}{16}$; $\frac{3}{8}$

Page 37. — Practice in Changing Improper Fractions to Whole or Mixed Numbers. 1A. 1 2A. $1\frac{3}{8}$ 3A. $9\frac{2}{3}$ 4A. $3\frac{1}{4}$
5A. 1 6A. 5 7A. $2\frac{1}{7}$ 8A. $1\frac{2}{7}$ 9A. $2\frac{1}{3}$ 10A. 1 1B. $1\frac{5}{6}$
2B. 1 3B. 7 4B. $4\frac{1}{3}$ 5B. 10 6B. $2\frac{2}{3}$ 7B. $1\frac{2}{3}$ 8B. 3
9B. $2\frac{1}{10}$ 10B. $1\frac{1}{2}$ 1C. 1 2C. 3 3C. 1 4C. 11 5C. $9\frac{3}{4}$
6C. 1 7C. 2 8C. 1 9C. 3 10C. 1 1D. $5\frac{3}{4}$ 2D. 1
3D. $2\frac{1}{2}$ 4D. $1\frac{4}{9}$ 5D. 1 6D. 5 7D. $3\frac{2}{5}$ 8D. 1 9D. $1\frac{1}{4}$
10D. $1\frac{4}{5}$ 1E. 1 2E. $1\frac{1}{6}$ 3E. $1\frac{7}{12}$ 4E. $3\frac{2}{3}$ 5E. $1\frac{1}{5}$ 6E. $1\frac{7}{8}$
7E. $1\frac{2}{3}$ 8E. $2\frac{1}{8}$ 9E. $2\frac{12}{13}$ 10E. $1\frac{2}{5}$ 1F. $2\frac{5}{8}$ 2F. $3\frac{2}{7}$ 3F. $3\frac{1}{2}$
4F. $1\frac{9}{16}$ 5F. $2\frac{1}{15}$ 6F. $5\frac{2}{9}$ 7F. $4\frac{1}{8}$ 8F. $1\frac{1}{3}$ 9F. $2\frac{5}{9}$ 10F. $3\frac{4}{5}$
Practice in Adding Fractions. 1A. $1\frac{1}{3}$ 2A. $1\frac{1}{5}$ 3A. $1\frac{1}{7}$
4A. $1\frac{1}{9}$ 5A. 1 6A. 2 7A. 2 8A. 1 1B. $1\frac{2}{5}$ 2B. $2\frac{1}{4}$
3B. $1\frac{5}{6}$ 4B. $1\frac{7}{8}$ 5B. $1\frac{5}{16}$ 6B. $1\frac{1}{8}$ 7B. $2\frac{1}{10}$ 8B. $1\frac{2}{15}$
1C. $1\frac{1}{2}$ 2C. $1\frac{2}{3}$ 3C. $1\frac{3}{4}$ 4C. $1\frac{1}{5}$ 5C. $1\frac{1}{8}$ 6C. $1\frac{1}{4}$
7C. $1\frac{1}{6}$ 8C. $1\frac{1}{5}$

Page 38. — 1A. $\frac{3}{2}$ 2A. $\frac{7}{3}$ 3A. $\frac{7}{2}$ 4A. $\frac{31}{6}$ 5A. $\frac{19}{4}$
1B. $\frac{23}{3}$ 2B. $\frac{33}{5}$ 3B. $\frac{7}{4}$ 4B. $\frac{15}{2}$ 5B. $\frac{47}{8}$ 1C. $\frac{59}{4}$ 2C. $\frac{14}{3}$
3C. $\frac{40}{3}$ 4C. $\frac{19}{8}$ 5C. $\frac{51}{5}$ 1D. $\frac{47}{5}$ 2D. $\frac{71}{6}$ 3D. $\frac{65}{8}$
4D. $\frac{64}{5}$ 5D. $\frac{29}{8}$

Page 39. — 1. 4 dollars; 3 quarters left over 2. $1\frac{1}{2}$ 3. $1\frac{1}{2}$
4. 17 5. 15 6. 2; 4; 5; 18; 25

PAGE 41. — Division Practice. **1A.** $9\frac{3}{4}$ **2A.** $37\frac{3}{5}$ **3A.** $8\frac{4}{51}$ **4A.** $16\frac{11}{21}$ **5A.** $7\frac{2}{9}$ **1B.** $9\frac{1}{3}$ **2B.** $6\frac{5}{13}$ **3B.** $4\frac{1}{8}$ **4B.** $5\frac{1}{13}$ **5B.** $3\frac{2}{29}$ **1C.** $10\frac{26}{37}$ **2C.** $8\frac{31}{53}$ **3C.** $17\frac{2}{17}$ **4C.** $8\frac{1}{3}$ **5C.** $8\frac{1}{3}$

Practice in Subtracting Fractions. **1A.** $\frac{1}{3}$ **2A.** $\frac{3}{5}$ **3A.** $\frac{2}{5}$ **4A.** $\frac{5}{7}$ **5A.** 0 **6A.** $\frac{7}{9}$ **7A.** $\frac{7}{15}$ **8A.** 0 **1B.** $\frac{5}{9}$ **2B.** $\frac{4}{7}$ **3B.** $\frac{1}{9}$ **4B.** $\frac{1}{8}$ **5B.** $\frac{1}{8}$ **6B.** 0 **7B.** 0 **8B.** $\frac{1}{7}$

PAGE 43. — **1A.** $\frac{1}{2}$ **2A.** $\frac{3}{4}$ **3A.** $\frac{2}{3}$ **4A.** $\frac{2}{3}$ **5A.** $\frac{1}{2}$ **6A.** $\frac{1}{3}$ **7A.** $\frac{1}{6}$ **8A.** $\frac{2}{5}$ **1B.** $\frac{1}{4}$ **2B.** $\frac{1}{8}$ **3B.** $\frac{1}{5}$ **4B.** $\frac{1}{3}$ **5B.** $\frac{7}{12}$ **6B.** $\frac{3}{7}$ **7B.** $\frac{3}{8}$ **8B.** $\frac{2}{5}$ **1C.** $\frac{1}{4}$ **2C.** $\frac{1}{8}$ **3C.** $\frac{4}{9}$ **4C.** $\frac{3}{10}$ **5C.** $\frac{3}{10}$ **6C.** $\frac{5}{16}$ **7C.** $\frac{1}{12}$ **8C.** $\frac{1}{12}$ **1D.** $\frac{7}{12}$ **2D.** $\frac{3}{8}$ **3D.** $\frac{4}{9}$ **4D.** $\frac{1}{10}$ **5D.** $\frac{1}{8}$ **6D.** $\frac{1}{4}$ **7D.** $\frac{1}{6}$ **8D.** $\frac{2}{9}$

PAGE 44. — Addition Practice. **1.** 440 **2.** 417 **3.** 3697 **4.** 3971 **5.** 38,689

Practice in Subtracting Fractions. **1A.** $\frac{1}{12}$ **2A.** $\frac{1}{6}$ **3A.** $\frac{1}{6}$ **4A.** $\frac{2}{15}$ **5A.** $\frac{3}{10}$ **6A.** $\frac{3}{14}$ **7A.** $\frac{5}{12}$ **8A.** $\frac{4}{15}$ **1B.** $\frac{8}{21}$ **2B.** $\frac{7}{24}$ **3B.** $\frac{1}{42}$ **4B.** $\frac{1}{30}$ **5B.** $\frac{1}{24}$ **6B.** $\frac{1}{10}$ **7B.** $\frac{4}{21}$ **8B.** $\frac{3}{40}$

PAGE 45. — **1.** $\frac{64}{5}$ **2.** $\frac{1}{3}$ **3.** 1 **4.** $\frac{1}{2}$ **5.** $\frac{11}{16}$ **6.** $1\frac{7}{8}$ **7.** $4\frac{3}{5}$ **8.** $\frac{5}{16}$ **9.** 820 **10.** $\frac{11}{18}$; $\frac{7}{18}$ **11.** 6 **12.** 4

PAGE 50. — **1.** 4 inches **2.** 12 inches **3.** 10 inches **4.** 180 feet **5.** 360 feet

PAGE 53. — **1.** 5 **2.** 9 **3.** 1 **4.** 8 **5.** 7 sq. in.; 3 sq. in.; 6 sq. in.

PAGE 55. — **1.** 4 square inches **2.** 4 square inches **3.** 15 square inches **4.** 6 square inches **5.** 9 square inches **6.** 12 square inches **7.** 16 square inches **8.** 20 square inches **9.** 28 square inches **10.** 45 square inches

PAGE 58. — **1.** 18 **2.** 432 **3.** 3 **4.** 2 **5.** 432 **6.** 352 **7.** 252 **8.** 1728 **9.** 12 **10.** 12

PAGE 59. — **1.** 36, 37, or 38 **2.** 12 or 13 **3.** 9 **4.** $11' \times 12'$ **5.** 14 **6.** 11 feet **7.** 41 feet **8.** 21 feet **9.** 13 **10.** 4 **11.** $9' \times 12'$ **12.** $11' \times 12'$ **13.** $9' \times 12'$

PAGE 62. — **1.** $\frac{1}{8}$ **2.** 2136 **3.** 7 sq. in. **4.** 186,027 **5.** 60 square inches **6.** $1\frac{3}{8}$ **7.** $2635\frac{17}{29}$ **8.** 2,534,225 **9.** 400 **10.** 768; 112 **11.** $1\frac{5}{16}$ inches **12.** 1020

PAGE 68. — **1A.** $\frac{1}{8}$ **2A.** $\frac{2}{9}$ **3A.** $\frac{1}{16}$ **4A.** $\frac{3}{16}$ **1B.** $\frac{9}{16}$ **2B.** $\frac{1}{10}$ **3B.** $\frac{4}{9}$ **4B.** $\frac{1}{18}$ **1C.** $\frac{1}{6}$ **2C.** $\frac{15}{28}$ **3C.** $\frac{1}{12}$ **4C.** $\frac{8}{15}$ **1D.** $\frac{2}{21}$ **2D.** $\frac{1}{9}$ **3D.** $\frac{15}{32}$ **4D.** $\frac{1}{14}$ **1E.** $\frac{1}{12}$ **2E.** $\frac{3}{8}$ **3E.** $\frac{3}{10}$ **4E.** $\frac{3}{12}$, or $\frac{1}{4}$ **1F.** $\frac{5}{12}$ **2F.** $\frac{6}{15}$, or $\frac{2}{5}$ **3F.** $\frac{2}{9}$ **4F.** $\frac{5}{14}$

PAGE 69. — **1A.** $\frac{1}{4}$ **2A.** $\frac{8}{15}$ **3A.** $\frac{2}{9}$ **4A.** $\frac{9}{16}$ **1B.** $\frac{3}{8}$ **2B.** $\frac{1}{8}$ **3B.** $\frac{8}{21}$ **4B.** $\frac{2}{15}$ **1C.** $\frac{4}{15}$ **2C.** $\frac{9}{20}$ **3C.** $\frac{1}{6}$ **4C.** $\frac{10}{27}$ **1D.** $\frac{3}{20}$ **2D.** $\frac{4}{21}$ **3D.** $\frac{15}{28}$ **4D.** $\frac{1}{10}$

1. $\frac{1}{2}$ **2.** $\frac{1}{3}$ **3.** $\frac{1}{2}$ of recipe **4.** $\frac{3}{8}$ cup **5.** $\frac{1}{4}$ cup **6.** $\frac{1}{2}$ cup sugar, $\frac{1}{4}$ cup milk, $\frac{1}{2}$ tablespoon butter, $\frac{1}{8}$ teaspoon vanilla, 1 teaspoon cocoa, and $\frac{1}{8}$ cup nut meats

PAGE 71. — **1.** $1\frac{2}{3}$ **2.** 39 cents **3.** 14 **4.** $1\frac{1}{3}$ **5.** 90 yards

PAGE 72. — Practice in Multiplying a Fraction by a Whole Number. **1A.** $3\frac{1}{3}$ **2A.** $\frac{8}{9}$ **3A.** $1\frac{1}{3}$ **4A.** $\frac{7}{8}$ **1B.** $\frac{3}{7}$ **2B.** $4\frac{2}{3}$ **3B.** $\frac{5}{9}$ **4B.** $\frac{2}{3}$ **1C.** $2\frac{2}{3}$ **2C.** $\frac{4}{9}$ **3C.** $2\frac{1}{4}$ **4C.** $\frac{7}{9}$ **1D.** $\frac{6}{7}$ **2D.** $1\frac{1}{2}$ **3D.** $\frac{4}{5}$ **4D.** $3\frac{3}{4}$

Multiplication Practice. **1A.** 86 **2A.** 185 **3A.** 1248 **4A.** 1590 **5A.** 896 **6A.** 4401 **1B.** 984 **2B.** 748 **3B.** 1710 **4B.** 4824 **5B.** 4582 **6B.** 7308 **1C.** 15,036 **2C.** 30,316 **3C.** 191,622 **4C.** 217,932 **5C.** 324,100 **6C.** 82,612

PAGE 73. — **1A.** $2\frac{2}{3}$ **2A.** $2\frac{1}{2}$ **3A.** $1\frac{2}{3}$ **4A.** $4\frac{1}{2}$ **1B.** $3\frac{3}{4}$ **2B.** $3\frac{1}{3}$ **3B.** $\frac{3}{8}$ **4B.** $2\frac{1}{3}$ **1C.** $5\frac{1}{4}$ **2C.** $\frac{8}{9}$ **3C.** $4\frac{2}{3}$ **4C.** $2\frac{1}{4}$ **1D.** $2\frac{2}{3}$ **2D.** $\frac{7}{8}$ **3D.** $6\frac{3}{4}$ **4D.** $5\frac{1}{3}$

1. No **2.** $\frac{3}{8}$ **3.** $8 \times \frac{1}{2}$ **4.** $\frac{9}{10}$ **5.** \$9; \$3 **6.** $\frac{5}{16}$

PAGE 75. — **1.** 6 cups sugar, 3 cups milk, 6 tablespoons butter, $1\frac{1}{2}$ teaspoons vanilla, 9 teaspoons cocoa, $1\frac{1}{2}$ cups nuts **2.** 1 cup flour, 1 teaspoon baking powder, $\frac{1}{8}$ teaspoon salt, yolk of 1 egg, $\frac{1}{2}$ cup cream, 2 tablespoons melted butter, white of 1 egg **3.** $\frac{1}{3}$ quart milk, $\frac{1}{3}$ cup sugar, $\frac{1}{3}$ tablespoon cornstarch, 1 egg, $1\frac{1}{3}$ cups cream, $\frac{1}{3}$ tablespoon vanilla **4.** 2 cups flour, $\frac{1}{4}$ teaspoon salt, $\frac{1}{2}$ teaspoon baking powder, 1 teaspoon cinnamon, $\frac{3}{8}$ teaspoon allspice and nutmeg, $\frac{1}{4}$ teaspoon cloves, $\frac{1}{4}$ teaspoon mace, $1\frac{1}{2}$ pounds raisins, $\frac{1}{2}$ pound currants, $\frac{1}{2}$ pound figs, $\frac{1}{2}$ pound citron, grated rind of $\frac{1}{2}$ lemon, 1 cup butter, 1 cup sugar, 6 eggs, $\frac{1}{4}$ cup coffee

PAGE 76. — **1.** $1\frac{7}{8}$ **2.** 24 **3.** 12 **4.** 9 **5.** \$.54; \$.18; \$.36 **6.** 70 **7.** $\frac{1}{2}$ yard **8.** \$.24; \$.28; \$.40

PAGE 81. — **1A.** $\frac{1}{9}$ **2A.** $\frac{1}{7}$ **3A.** $\frac{3}{10}$ **4A.** 1 **1B.** $\frac{1}{10}$ **2B.** $\frac{2}{3}$ **3B.** $\frac{1}{3}$ **4B.** $\frac{7}{18}$ **1C.** $\frac{7}{12}$ **2C.** $\frac{3}{16}$ **3C.** 1 **4C.** $\frac{2}{5}$ **1D.** $\frac{7}{45}$ **2D.** 1 **3D.** $\frac{3}{5}$ **4D.** $\frac{4}{5}$

PAGE 82. — **1.** $3\frac{3}{4}$ **2.** $1\frac{5}{24}$ **3.** $\frac{8}{15}$ **4.** $1512\frac{37}{38}$ **5.** 587,476 **6.** $\frac{3}{14}$ **7.** $\frac{1}{4}$ **8.** $1\frac{3}{7}$ **9.** $\frac{1}{6}$ **10.** \$6250; \$205.48 **11.** 25 **12.** \$253

PAGE 86. — **1.** $\frac{1}{5}$ dollar **2.** $\frac{3}{16}$ yard **3.** $\frac{1}{6}$ yard **4.** $\frac{1}{15}$ hour **1A.** $\frac{5}{72}$ **2A.** $\frac{1}{28}$ **3A.** $\frac{5}{216}$ **4A.** $\frac{1}{30}$ **1B.** $\frac{3}{20}$ **2B.** $\frac{1}{24}$ **3B.** $\frac{1}{18}$ **4B.** $\frac{1}{54}$ **1C.** $\frac{1}{12}$ **2C.** $\frac{1}{45}$ **3C.** $\frac{1}{24}$ **4C.** $\frac{1}{32}$

PAGE 87. — **1.** 200 **2.** 20 **3.** 4 **4.** $1\frac{1}{58}$ **5.** 829

PAGE 89. — **1.** $\frac{3}{8}$ **2.** $\frac{2}{9}$ **3.** $\frac{1}{4}$ **4.** $\frac{1}{3}$ **5.** $\frac{1}{4}$

PAGE 90. — **1.** 8 **2.** 14 **3.** 12

1A. 24 **2A.** 25 **3A.** 12 **4A.** 36 **1B.** $26\frac{2}{3}$ **2B.** 28 **3B.** 12 **4B.** 27 **1C.** 18 **2C.** 30 **3C.** $6\frac{3}{4}$ **4C.** $34\frac{2}{7}$

PAGE 91. — **1A.** $\frac{8}{9}$ **2A.** $\frac{1}{2}$ **3A.** $\frac{2}{3}$ **4A.** 4 **1B.** $1\frac{1}{20}$ **2B.** $1\frac{1}{6}$ **3B.** $\frac{2}{9}$ **4B.** $2\frac{1}{3}$ **1C.** $1\frac{1}{9}$ **2C.** $1\frac{1}{4}$ **3C.** 2 **4C.** $\frac{4}{5}$ **1D.** $\frac{6}{7}$ **2D.** $1\frac{1}{16}$ **3D.** $\frac{8}{9}$ **4D.** $\frac{2}{3}$ **1E.** $\frac{6}{7}$ **2E.** $\frac{10}{11}$ **3E.** $1\frac{1}{7}$ **4E.** $1\frac{4}{15}$

PAGE 92. — **1A.** $\frac{1}{2}$ **2A.** $\frac{1}{3}$ **3A.** $\frac{3}{5}$ **1B.** $\frac{2}{3}$ **2B.** $\frac{2}{5}$ **3B.** $\frac{7}{8}$ **1C.** $\frac{1}{2}$ **2C.** $\frac{1}{5}$ **3C.** $\frac{6}{7}$ **1D.** $\frac{3}{4}$ **2D.** $\frac{3}{4}$ **3D.** $\frac{3}{5}$ **1E.** $\frac{3}{4}$ **2E.** $\frac{2}{3}$ **3E.** $\frac{1}{6}$ **1F.** $\frac{1}{3}$ **2F.** $\frac{1}{2}$ **3F.** $\frac{1}{9}$ **1G.** $\frac{1}{4}$ **2G.** $\frac{1}{2}$ **3G.** $\frac{1}{3}$ **1H.** $\frac{1}{3}$ **2H.** $\frac{7}{8}$ **3H.** $\frac{1}{4}$ **1I.** $\frac{3}{4}$ **2I.** $\frac{4}{5}$ **3I.** $\frac{8}{9}$ **1J.** $\frac{1}{9}$ **2J.** $\frac{2}{7}$ **3J.** $\frac{7}{8}$

PAGE 93. — **1.** $1.65 **2.** $8.15 **3.** $1.90 **4.** $1.15 **5.** $51.90

PAGE 94. — **1.** 96; 160; 384 **2.** 2; $\frac{1}{2}$; 4 **3.** 300; 50 **4.** 4000; 1000; 500; 18,000 **5.** 2; $1\frac{1}{2}$; 4; $3\frac{1}{4}$ **6.** 300 **7.** $5\frac{1}{5}$ **8.** 9 tons and 140 pounds over

PAGE 95. — **1.** $\frac{5}{72}$ **2.** $\frac{3}{4}$ **3.** 20 **4.** $23\frac{1}{3}$ **5.** $\frac{1}{6}$ **6.** $\frac{1}{4}$ **7.** 1 **8.** 2000 **9.** Pennsylvania; 4528 square miles **10.** $34\frac{2}{3}$ **11.** 8 inches

PAGE 99. — **1.** $8\frac{1}{12}$ **2.** $1\frac{7}{16}$ **3.** $31\frac{7}{8}$ **4.** $18\frac{1}{2}$ pounds; $6\frac{1}{2}$ pounds **5.** $3\frac{7}{16}$ miles **6.** $19\frac{1}{2}$

PAGE 100. — Practice in Adding Mixed Numbers. **1A.** $5\frac{3}{5}$ **2A.** $11\frac{7}{8}$ **3A.** $14\frac{11}{15}$ **4A.** $9\frac{1}{3}$ **5A.** $9\frac{1}{2}$ **1B.** $13\frac{7}{10}$ **2B.** 14 **3B.** 18 **4B.** 15 **5B.** $16\frac{3}{5}$ **1C.** $23\frac{3}{8}$ **2C.** $12\frac{5}{12}$ **3C.** $20\frac{1}{3}$ **4C.** $19\frac{1}{8}$ **5C.** $20\frac{2}{3}$

Long Division Practice. **1A.** 4 **2A.** $4\frac{1}{21}$ **3A.** 2 **4A.** $2\frac{11}{34}$ **5A.** 3 **6A.** $2\frac{1}{54}$ **1B.** 3 **2B.** $8\frac{2}{29}$ **3B.** 4 **4B.** 3 **5B.** 5 **6B.** $2\frac{1}{29}$

1. 20 **2.** $61\frac{1}{4}$ pounds **3.** $12 **4.** 4 **5.** 49 pounds

PAGE 101. — **1A.** 12 **2A.** $13\frac{11}{12}$ **3A.** $15\frac{11}{14}$ **4A.** $8\frac{1}{3}$ **5A.** $17\frac{3}{4}$ **1B.** $17\frac{9}{14}$ **2B.** 19 **3B.** 17 **4B.** 25 **5B.** $21\frac{3}{7}$ **1C.** $15\frac{2}{9}$ **2C.** $17\frac{1}{3}$ **3C.** $19\frac{1}{9}$ **4C.** $16\frac{7}{18}$ **5C.** $15\frac{1}{2}$

PAGE 102. — **1A.** $2\frac{3}{5}$ **2A.** $3\frac{1}{3}$ **3A.** $4\frac{4}{9}$ **4A.** $4\frac{4}{7}$ **5A.** $3\frac{2}{5}$ **6A.** $3\frac{2}{5}$ **1B.** $4\frac{1}{4}$ **2B.** $8\frac{1}{15}$ **3B.** $16\frac{5}{8}$ **4B.** $1\frac{5}{8}$ **5B.** $83\frac{1}{4}$ **6B.** $57\frac{1}{12}$

PAGE 104. — **1A.** $2\frac{1}{2}$ **2A.** $\frac{7}{10}$ **3A.** $2\frac{11}{14}$ **4A.** $5\frac{3}{4}$ **5A.** $1\frac{5}{8}$ **6A.** $\frac{15}{16}$ **1B.** $\frac{1}{2}$ **2B.** $\frac{3}{5}$ **3B.** $1\frac{5}{9}$ **4B.** $3\frac{2}{3}$ **5B.** $2\frac{1}{2}$ **6B.** $4\frac{1}{4}$

PAGE 105. — **1A.** $3\frac{1}{2}$ **2A.** $10\frac{4}{5}$ **3A.** $\frac{3}{8}$ **4A.** $1\frac{1}{20}$ **5A.** $\frac{19}{21}$ **6A.** $1\frac{17}{24}$ **1B.** $14\frac{7}{24}$ **2B.** $15\frac{7}{12}$ **3B.** $53\frac{13}{20}$ **4B.** $36\frac{1}{15}$ **5B.** $55\frac{25}{63}$ **6B.** $\frac{29}{40}$

1. $31\frac{3}{4}$ feet **2.** $6\frac{7}{8}$ **3.** $22\frac{1}{4}$ pounds

PAGE 106. — How Much Baby Girls Grow. $5\frac{3}{8}$ inches; $\frac{5}{8}$ inch; $\frac{1}{2}$ inch; $\frac{5}{8}$ inch; $\frac{1}{4}$ inch; $\frac{1}{2}$ inch; $\frac{1}{2}$ inch. $9\frac{7}{12}$ pounds; $\frac{7}{8}$ pound; $\frac{5}{8}$ pound; $\frac{7}{8}$ pound; $\frac{3}{8}$ pound; $\frac{5}{8}$ pound; $\frac{5}{8}$ pound

Problems. **1.** \$5.48 **2.** \$.55 **3.** \$108 **4.** \$22 **5.** \$2.16

PAGE 107. — **1A.** 7 **2A.** $3\frac{2}{7}$ **3A.** $9\frac{4}{15}$ **1B.** 21 **2B.** 31 **3B.** 62 **1C.** 170 **2C.** 375 **3C.** $200\frac{17}{52}$ **1D.** $6\frac{5}{39}$ **2D.** $2\frac{2}{15}$ **3D.** 4

1. $9\frac{1}{12}$ **2.** $4\frac{4}{9}$ **3.** 205 **4.** $57\frac{1}{12}$ **5.** $28\frac{5}{12}$ **6.** $19\frac{1}{8}$ **7.** $3\frac{2}{3}$ **8.** $\frac{19}{21}$ **9.** 2899 feet **10.** 640 **11.** $187\frac{7}{8}$ **12.** \$4

PAGE 112. — **1A.** $\frac{7}{8}$ **2A.** $\frac{16}{21}$ **3A.** $\frac{5}{6}$ **4A.** $\frac{9}{14}$ **5A.** $1\frac{11}{10}$ **6A.** $\frac{11}{30}$ **7A.** $\frac{23}{24}$ **8A.** $\frac{11}{12}$ **1B.** $\frac{1}{2}$ **2B.** $9\frac{1}{12}$ **3B.** $\frac{2}{3}$ **4B.** $13\frac{7}{10}$ **5B.** $\frac{1}{4}$ **6B.** $23\frac{3}{8}$ **7B.** $18\frac{1}{3}$ **8B.** $10\frac{1}{8}$

PAGE 113. — Review of Subtraction of Fractions and Mixed Numbers. **1A.** $\frac{5}{7}$ **2A.** $\frac{3}{4}$ **3A.** $\frac{7}{15}$ **4A.** $\frac{1}{6}$ **5A.** $\frac{5}{8}$ **6A.** $\frac{2}{5}$ **7A.** $\frac{1}{4}$ **8A.** $\frac{4}{9}$ **1B.** $\frac{7}{12}$ **2B.** $\frac{2}{5}$ **3B.** $\frac{1}{2}$ **4B.** $\frac{3}{40}$ **5B.** $1\frac{5}{8}$ **6B.** $\frac{4}{9}$ **7B.** $7\frac{3}{8}$ **8B.** $\frac{7}{12}$

Review of Multiplication of Fractions. **1A.** $\frac{1}{9}$ **2A.** $\frac{2}{3}$ **3A.** $\frac{1}{3}$ **4A.** $\frac{7}{18}$ **1B.** $36\frac{3}{4}$ **2B.** $31\frac{1}{2}$ **3B.** 15 **4B.** 1

Review of Division of Fractions. **1A.** $\frac{8}{9}$ **2A.** $1\frac{1}{6}$ **3A.** 12 **4A.** 4 **1B.** $1\frac{1}{9}$ **2B.** 30 **3B.** $1\frac{1}{4}$ **4B.** $\frac{5}{7}$

PAGE 119. — **1.** $9\frac{1}{24}$ **2.** .47 **3.** $\frac{2}{3}$ **4.** $1476\frac{12}{47}$ **5.** $109\frac{1}{3}$ **6.** $24\frac{43}{48}$ **7.** \$11.58 **8.** $\frac{5}{6}$ **9.** $282\frac{7}{8}$ pounds **10.** 10 hours, 10 minutes **11.** Yes; 1600 square feet; yes; 160 feet and 200 feet **12.** 16 years

PAGE 125. — **1.** $8\frac{11}{24}$ **2.** \$30.38 **3.** $2\frac{7}{24}$ **4.** \$808.09 **5.** $\frac{7}{10}$ **6.** $3016\frac{11}{28}$ **7.** Four hundred sixty-three thousandths **8.** $\frac{5}{12}$ **9.** \$2.05 **10.** 81 **11.** \$13.20 **12.** 168 pounds; $1\frac{2}{5}$ pounds

PAGE 128. — **1A.** 176 **2A.** 1022 **3A.** 26 **4A.** 579 **5A.** 4819 **6A.** 369 **1B.** 5083 **2B.** 5093 **3B.** 3157 **4B.** 5714 **5B.** 8461 **6B.** 556

PAGE 129. — Addition Practice. **1.** 376 **2.** 389 **3.** 3631 **4.** 39,019 **5.** 36,267

Problems. **1.** \$49 **2.** 7812 **3.** 119,448,974 **4.** 774 miles **5.** $8\frac{13}{14}$

PAGE 130. — **1.** $\frac{3}{4}$ **2.** $24\frac{13}{30}$ **3.** \$188.48 **4.** 10,288 **5.** $\frac{5}{18}$ **6.** 1,872,888 **7.** \$15.29 **8.** $15\frac{23}{56}$ **9.** 20 **10.** \$4.52 **11.** 3 **12.** \$7.65

PAGE 133. — **1.** \$313.80 **2.** \$250.80; \$63.00 **3.** \$885.60 **4.** \$223.60; \$725.00 **5.** \$491.80; \$233.20 **6.** \$129.80 **7.** \$3.40

PAGE 135. — **1.** \$15.45 **2.** Texas; 91,350 square miles **3.** \$329.13 **4.** 292; 333; Helen's

PAGE 138. — **1.** \$7.45 **2.** \$4.26; \$2.13

PAGE 139. — **1.** $\frac{7}{9}$ **2.** 39 **3.** $85\frac{11}{30}$ **4.** 36 **5.** $3\frac{3}{5}$ **6.** $15\frac{25}{42}$ **7.** $\frac{8}{9}$ **8.** $209,945.96 **9.** $\frac{3}{4}$ **10.** $5.25 **11.** $\frac{2}{3}$; $\frac{1}{3}$ **12.** $\frac{5}{6}$

PAGE 141. — **1.** 11 hr. 10 min. **2.** 16 lb. 15 oz. **3.** 15 pk. 6 qt., or 3 bu. 3 pk. 6 qt. **4.** 13 gal. 3 qt. **5.** 7 yd. 2 ft. 2 in. **6.** 11 bu. 2 pk. **7.** 12 T. 799 lb. **8.** 10 hr. 41 min. 15 sec. **9.** 19 gal. 2 qt. **10.** $6\frac{1}{3}$ **11.** 14 T. 1980 lb.

PAGE 143. — **1.** 1 hr. 10 min. **2.** 9 bu. 2 pk. **3.** 2 ft. **4.** 2 gal. 1 qt. **5.** 5 lb. 4 oz. **6.** 22 rd. 2 yd. 1 ft. 6 in., or 22 rd. $2\frac{1}{2}$ yd. **7.** 4 T. 1185 lb. **8.** 2 bu. 5 qt. **9.** 4 in. **10.** 1 T. 575 lb. **11.** 8 in. **12.** 3 lb. 8 oz.

PAGE 147. — **1A.** $14\frac{2}{3}$ **2A.** $14\frac{5}{8}$ **3A.** 28 **4A.** $22\frac{1}{2}$ **1B.** $13\frac{1}{3}$ **2B.** $13\frac{1}{3}$ **3B.** $29\frac{1}{2}$ **4B.** $31\frac{1}{2}$

PAGE 148. — **1A.** 21 **2A.** $37\frac{1}{2}$ **3A.** $33\frac{3}{5}$ **4A.** $277\frac{3}{4}$ **1B.** 339 **2B.** $3\frac{3}{5}$ **3B.** 134 **4B.** $145\frac{1}{2}$

1. $2.26 **2.** $8.84 **3.** $3.81 **4.** $5.46 **5.** $2.50 **6.** $6.25 **7.** $15.00; total, $44.12 **8.** $.98 **9.** $.99 **10.** $1.56 **11.** $2.40 **12.** $5.00; total, $10.93; received $33.19 more for produce

PAGE 149. — **1.** $35\frac{1}{3}$ **2.** $1\frac{1}{6}$ **3.** $\frac{9}{14}$ **4.** $33\frac{59}{120}$ **5.** $2\frac{1}{3}$ **6.** $1030\frac{7}{38}$ **7.** $277\frac{3}{4}$ **8.** $4\frac{17}{24}$ **9.** $\frac{2}{5}$ apple trees, $\frac{4}{15}$ peach trees, $\frac{1}{4}$ pear trees, and $\frac{1}{12}$ cherry trees **10.** $7\frac{1}{2}$ **11.** $\frac{5}{7}$; $\frac{6}{77}$

PAGE 151. — Multiplying Mixed Numbers by Fractions. **1A.** 4 **2A.** $8\frac{1}{3}$ **3A.** $1\frac{1}{3}$ **4A.** $10\frac{5}{7}$ **1B.** $20\frac{5}{6}$ **2B.** 1 **3B.** $2\frac{1}{2}$ **4B.** $6\frac{1}{4}$ **1C.** $2\frac{1}{7}$ **2C.** $11\frac{1}{9}$ **3C.** 1 **4C.** $6\frac{1}{4}$

Multiplying Mixed Numbers by Mixed Numbers. **1A.** $10\frac{1}{2}$ **2A.** 24 **3A.** $8\frac{2}{5}$ **4A.** $22\frac{1}{2}$ **1B.** 77 **2B.** $56\frac{2}{9}$ **3B.** $35\frac{1}{5}$ **4B.** $33\frac{1}{16}$ **1C.** 91 **2C.** $312\frac{1}{2}$ **3C.** $10\frac{5}{12}$ **4C.** 70

PAGE 152. — Dividing Mixed Numbers by Whole Numbers. **1A.** $2\frac{3}{4}$ **2A.** $2\frac{2}{3}$ **1B.** $1\frac{7}{16}$ **2B.** $1\frac{7}{8}$

Practice in Dividing Mixed Numbers by Whole Numbers. **1A.** $\frac{5}{6}$ **2A.** $\frac{1}{2}$ **3A.** $1\frac{2}{27}$ **4A.** $\frac{27}{40}$ **1B.** $1\frac{15}{32}$ **2B.** $3\frac{1}{5}$ **3B.** $1\frac{3}{28}$ **4B.** $1\frac{41}{45}$ **1C.** $1\frac{71}{160}$ **2C.** $1\frac{19}{30}$ **3C.** $1\frac{7}{40}$ **4C.** $1\frac{9}{20}$

PAGE 153. — **1A.** $\frac{16}{27}$ **2A.** $1\frac{7}{29}$ **3A.** $\frac{4}{5}$ **4A.** $\frac{12}{25}$ **1B.** $\frac{16}{57}$ **2B.** $\frac{32}{53}$ **3B.** $\frac{27}{29}$ **4B.** $\frac{40}{71}$ **1C.** $\frac{9}{11}$ **2C.** $\frac{5}{11}$ **3C.** $2\frac{1}{4}$ **4C.** $\frac{16}{21}$

1. 8 tons and 430 pounds over **2.** $1377.70 **3.** 1460; 292 miles average **4.** $4.80 **9.** 25 **10.** $187.20

PAGE 156. — Practice in Dividing Mixed Numbers by Fractions. **1A.** $4\frac{2}{3}$ **2A.** 8 **3A.** $2\frac{3}{4}$ **4A.** $11\frac{1}{5}$ **1B.** $5\frac{1}{2}$ **2B.** 19 **3B.** 2 **4B.** $6\frac{3}{4}$ **1C.** $12\frac{1}{3}$ **2C.** $16\frac{1}{2}$ **3C.** 7 **4C.** 14 **1D.** 9 **2D.** 12 **3D.** $6\frac{1}{3}$ **4D.** 18

Practice in Dividing Fractions by Mixed Numbers. **1A.** $\frac{3}{44}$ **2A.** $\frac{2}{23}$ **3A.** $\frac{6}{23}$ **4A.** $\frac{354}{184}$ **1B.** $\frac{14}{153}$ **2B.** $\frac{1}{7}$ **3B.** $\frac{6}{133}$ **4B.** $\frac{16}{153}$ **1C.** $\frac{2}{13}$ **2C.** $\frac{70}{747}$ **3C.** $\frac{1}{15}$ **4C.** $\frac{1}{10}$ **1D.** $\frac{1}{6}$ **2D.** $\frac{160}{1467}$ **3D.** $\frac{10}{423}$ **4D.** $\frac{2}{45}$

PAGE 157. — **1.** 27; $36.45 **2.** $2.95 **3.** $11\frac{1}{4}$ **4.** 1 minute, 15 seconds **5.** $6.74

PAGE 158. — **1A.** $1\frac{1}{9}$ **2A.** 4 **3A.** $1\frac{107}{127}$ **1B.** $\frac{10}{23}$ **2B.** $3\frac{73}{144}$ **3B.** $1\frac{31}{63}$ **1C.** $1\frac{13}{38}$ **2C.** $1\frac{3}{22}$ **3C.** $1\frac{83}{165}$ **1D.** $\frac{2}{3}$ **2D.** $1\frac{10}{39}$ **3D.** 6

PAGE 159. — **1.** $2\frac{3}{4}$ **2.** $10\frac{17}{24}$ **3.** $15\frac{1}{3}$ **4.** $34\frac{13}{21}$ **5.** $37.14 **6.** 4,884,278 **7.** $1\frac{10}{39}$ **8.** 148,574 **9.** Gained; $1\frac{3}{8}$ pounds **10.** 8 **11.** $10.50 **12.** 477

PAGE 160. — **1.** $11\frac{1}{2}$ **2.** $61\frac{7}{13}$ days **3.** $10.58 **4.** 40 **1A.** 32 **2A.** 193 **3A.** 9020 **4A.** 608 **5A.** 7642 **6A.** 2341 **1B.** 2009 **2B.** 523 **3B.** 9008 **4B.** 1758 **5B.** 489 **6B.** 5644 **1C.** 839 **2C.** 7169 **3C.** 1382 **4C.** 2576 **5C.** 3681 **6C.** 2578

PAGE 161. — **1.** $148.05 **2.** $8.55 **3.** $120\frac{80}{81}$ miles **4.** $62\frac{114}{325}$ **5.** $9.10

PAGE 167. — **1.** 15.6 **2.** 2.06 **3.** 10.69 **4.** 5.47 **5.** 1.16 **6.** 2.9 **7.** 56.98 **8.** 22.22 **9.** 47.64 **10.** 41.67

PAGE 168. — **1.** $11\frac{1}{24}$ **2.** 28.15 **3.** $2\frac{5}{8}$ **4.** 32,307 **5.** 139.44 **6.** $124\frac{19}{120}$ **7.** $36\frac{3}{4}$ **8.** $\frac{13}{20}$ **9.** 164.19 **10.** 2112 **11.** $36 **12.** $3400

PAGE 170. — **1.** 3.255 **2.** 28.435 **3.** 56.305 **4.** 1.66 **5.** 12.111 **6A.** 20.6 **7A.** 11.34 **8A.** 11.32 **9A.** 8.84 **10A.** 29.087 **6B.** 24.301 **7B.** 25.38 **8B.** 102.629 **9B.** 71.855 **10B.** 81.824

1A. 714 **2A.** 768 **3A.** 9984 **4A.** 2739 **5A.** 72,076 **1B.** 25,284 **2B.** 38,208 **3B.** 546,000 **4B.** 24,253 **5B.** 168,224 **1C.** 197,200 **2C.** 446,970 **3C.** 172,788 **4C.** 262,434 **5C.** 1,662,472

PAGE 171. — **1.** 600 **2.** 361.8 **3.** 1290.9 **4.** 84.5 miles **5.** 2228

PAGE 173. — **1.** 186.4 **2.** 503.8 **3.** 101.4 **4.** 168 **5.** 33.1 **6.** 81.5 **7.** 332.5 **8.** 467 **9.** Muscatine to Chillicothe **10.** Kansas City to Ottumwa

PAGE 175. — **1.** 1.192 **2.** 6.65 **3.** 38.418 **4.** .087 **5.** .25 **6A.** 3.908 **7A.** 8.8 **8A.** 27.256 **9A.** .805 **10A.** 3.19 **6B.** 823.25 **7B.** 24.735 **8B.** .982 **9B.** .26 **10B.** 796.784

PAGE 176. — **1.** 41,904 **2.** $\frac{5}{6}$ **3.** $101\frac{7}{24}$ **4.** 207 **5.** $47\frac{11}{12}$ **6.** $59\frac{23}{60}$ **7.** $7\frac{13}{21}$ **8.** 23,081 **9.** 61.934 **10.** Galveston; 2.8 inches **11.** Yes; 48 **12.** 250

PAGE 177. — **1.** Mary's; 2 **2.** $23.40 **3.** 16 **4.** $1087.50; $8700; $9787.50; $10,875

1A. 3 **2A.** $2\frac{1}{34}$ **3A.** 3 **4A.** $2\frac{4}{45}$ **1B.** 4 **2B.** $8\frac{1}{37}$ **3B.** 4 **4B.** 3 **1C.** 3 **2C.** $2\frac{4}{21}$ **3C.** 5 **4C.** $5\frac{1}{9}$

PAGE 178. — Average Height and Weight of Baby Boys. $2\frac{9}{10}$ inches; 3 inches; $\frac{3}{4}$ inch; $\frac{3}{8}$ inch; $1\frac{1}{2}$ inches; $\frac{3}{8}$ inch; $\frac{1}{2}$ inch; $\frac{3}{8}$ inch. $5\frac{2}{5}$ pounds; 5 pounds; $1\frac{1}{8}$ pounds; $\frac{5}{8}$ pound; $\frac{5}{8}$ pound; $\frac{1}{2}$ pound; $\frac{1}{2}$ pound; $\frac{1}{2}$ pound

Multiplication Practice. **1A.** 68 **2A.** 438 **3A.** 426 **4A.** 4065 **5A.** 1274 **6A.** 4776 **1B.** 588 **2B.** 946 **3B.** 4550 **4B.** 3690 **5B.** 3243 **6B.** 14,196 **1C.** 19,008 **2C.** 50,386 **3C.** 315,315 **4C.** 131,238 **5C.** 476,800 **6C.** 206,633

PAGE 181. — **1.** MDCCLXXVI **2.** MCMXXIV **4.** MCMXXVI **5.** MCDXCII **6.** 1906 **7.** 1928 **8.** 1684

PAGE 182. — **1A.** LXXV **2A.** MCMXXX **3A.** MMIII **4A.** DCLXXIII **1B.** DCCXXV **2B.** CIV **3B.** MCMXXXV **4B.** MMMCLXIV **1C.** MV **2C.** DCCCLXIV **3C.** CCXVI **4C.** MCMXL **1D.** MDCCCXCVI **2D.** MCMXIV **3D.** CMLXXVIII **4D.** DXXXVIII

PAGE 183. — **1.** 105.833 **2.** $31\frac{3}{4}$ **3.** 705 ft. **4.** $615 **5.** 1186 **6.** 47.73 **7.** 5 **8.** $11\frac{19}{21}$ **9.** 1925 **10.** $7 **11.** $1.85 **12.** $4\frac{19}{60}$

PAGE 189. — **1.** 407 **2.** 3883 **3.** 3776 **4.** 40,862 **5.** 38,026

PAGE 191. — **1.** 1440 **2.** 384 **3.** $10\frac{1}{2}$ **4.** 60 **5.** 144 **6.** 3072 **7.** 1944 **8.** $1\frac{1}{8}$ **9.** 11,664 **10.** $6\frac{140}{231}$

PAGE 192. — **1.** $10\frac{7}{10}$ **2.** MCMXXIX **3.** $8\frac{13}{20}$ **4.** 6.707 **5.** 2004 **6.** $312\frac{1}{2}$ **7.** 352,032 **8.** $4\frac{11}{16}$ **9.** 840.673 **10.** 300 miles **11.** 3.37 inches **12.** $42\frac{1}{2}$

PAGE 194. — **1.** 1090 **2.** 3230 **3.** $5715.20 **4.** 32 **5.** 240 **6.** 2 **7.** 144 **8.** 4 **9.** 240 **10.** 720 **11.** 15 **12.** 420 **13.** 2 **14.** $11\frac{1}{4}$ **15.** $8\frac{8}{55}$

PAGE 195. — **1A.** 5 **2A.** $3\frac{1}{9}$ **3A.** $9\frac{19}{13}$ **1B.** 180 **2B.** 304 **3B.** $200\frac{6}{17}$ **1C.** 200 **2C.** $53\frac{7}{31}$ **3C.** $40\frac{29}{43}$ **1D.** $2\frac{9}{16}$ **2D.** $6\frac{15}{29}$ **3D.** $4\frac{20}{21}$ **1E.** 560 **2E.** 900 **3E.** 207 **1F.** 278 **2F.** 729 **3F.** 500

1. 270 **2.** 2250; 225 **3.** 81 **4.** 100 **5.** 2025 **6.** 720

PAGE 198. — **1.** 5.38 **2.** 30 **3.** $63\frac{29}{42}$ **4.** $36\frac{1}{4}$ **5.** 8 ft

4 in. **6.** $24\frac{8}{9}$ **7.** $23\frac{13}{20}$ **8.** 5 ft. 7 in. **9.** 490.466 **10.** 50; 49.49 miles **11.** 1899 **12.** $6\frac{2}{3}¢$

PAGE 201. — **1A.** 20 **2A.** 29 **3A.** 79 **4A.** 85 **5A.** 101 **6A.** 27 **1B.** 399 **2B.** 67 **3B.** 789 **4B.** 61 **5B.** 226 **6B.** 1195 **1C.** 98 **2C.** 89 **3C.** 98 **4C.** 99 **5C.** 330 **6C.** 986 **1D.** 881 **2D.** 819 **3D.** 934 **4D.** 2280 **5D.** 19,459 **6D.** 171,439

PAGE 202. — **1A.** 38 **2A.** 25 **3A.** 323 **4A.** 947 **5A.** 209 **6A.** 479 **1B.** 89 **2B.** 335 **3B.** 578 **4B.** 105 **5B.** 548 **6B.** 686 **1C.** 6263 **2C.** 284 **3C.** 2186 **4C.** 7045 **5C.** 2071 **6C.** 1331 **1D.** 6458 **2D.** 7980 **3D.** 8439 **4D.** 9554 **5D.** 3710 **6D.** 2679 **1E.** 7417 **2E.** 5758 **3E.** 6898 **4E.** 6010 **5E.** 1139 **6E.** 1272 **1F.** 941 **2F.** 29 **3F.** 5604 **4F.** 1243 **5F.** 4762 **6F.** 56,639

PAGE 203. — Practice Test in Multiplication. **1A.** 756 **2A.** 946 **3A.** 1710 **4A.** 6232 **5A.** 7733 **6A.** 24,383 **1B.** 87,556 **2B.** 222,768 **3B.** 361,665 **4B.** 442,800 **5B.** 621,996 **6B.** 3,655,553 **1C.** 4,552,207 **2C.** 38,767,485 **3C.** 4,845,260 **4C.** 52,512,029 **5C.** 278,957,844 **6C.** 7,561,060,901

Practice Test in Division. — **1A.** 24 **2A.** 16 **3A.** 30 **1B.** 208 **2B.** 520 **3B.** 98 **1C.** 235 **2C.** 205 **3C.** 420

PAGE 205. — **1A.** $1\frac{1}{12}$ **2A.** $1\frac{17}{24}$ **3A.** $\frac{12}{35}$ **4A.** $1\frac{7}{24}$ **5A.** $1\frac{7}{15}$ **1B.** $1\frac{13}{24}$ **2B.** $1\frac{77}{120}$ **3B.** $1\frac{19}{72}$ **4B.** $1\frac{19}{24}$ **5B.** $1\frac{35}{48}$

PAGE 206. — **1A.** $8\frac{11}{12}$ **2A.** $14\frac{11}{12}$ **3A.** $31\frac{1}{4}$ **4A.** $13\frac{17}{21}$ **5A.** 80 **1B.** $37\frac{1}{2}$ **2B.** $62\frac{1}{2}$ **3B.** $15\frac{23}{24}$ **4B.** $30\frac{7}{16}$ **5B.** $26\frac{19}{36}$

PAGE 208. — Subtracting Common Fractions. **1A.** $\frac{1}{6}$ **2A.** $\frac{5}{12}$ **3A.** $\frac{5}{24}$ **4A.** $\frac{7}{24}$ **5A.** $\frac{17}{28}$ **1B.** $\frac{43}{60}$ **2B.** $\frac{1}{3}$ **3B.** $\frac{1}{3}$ **4B.** $\frac{11}{40}$ **5B.** $\frac{7}{45}$

Subtracting Mixed Numbers. **1A.** $8\frac{1}{12}$ **2A.** $5\frac{1}{6}$ **3A.** $2\frac{1}{4}$ **4A.** $24\frac{7}{12}$ **5A.** $35\frac{3}{5}$ **1B.** $21\frac{5}{8}$ **2B.** $24\frac{2}{3}$ **3B.** $70\frac{7}{10}$ **4B.** $25\frac{1}{3}$ **5B.** $22\frac{11}{12}$

PAGE 209. — Multiplying Common Fractions. **1A.** $\frac{1}{2}$ **2A.** $\frac{16}{21}$ **3A.** $\frac{3}{10}$ **4A.** $\frac{3}{4}$ **1B.** $4\frac{4}{5}$ **2B.** $\frac{9}{16}$ **3B.** $1\frac{7}{9}$ **4B.** 1 **1C.** $\frac{1}{4}$ **2C.** $13\frac{1}{8}$ **3C.** $1\frac{7}{8}$ **4C.** 2

Multiplying Mixed Numbers. **1A.** $312\frac{1}{2}$ **2A.** 100 **3A.** $41\frac{2}{3}$ **4A.** $133\frac{1}{3}$ **1B.** 500 **2B.** $12\frac{1}{2}$ **3B.** $16\frac{2}{3}$ **4B.** $12\frac{1}{2}$ **1C.** $8\frac{13}{14}$ **2C.** $35\frac{5}{7}$ **3C.** $12\frac{1}{2}$ **4C.** 1250

Dividing Common Fractions. **1A.** $1\frac{1}{8}$ **2A.** $\frac{3}{4}$ **3A.** $\frac{7}{9}$ **4A.** 2 **1B.** 1 **2B.** $1\frac{1}{9}$ **3B.** $\frac{1}{10}$ **4B.** $2\frac{2}{5}$ **1C.** 24 **2C.** $\frac{36}{49}$ **3C.** $3\frac{2}{3}$ **4C.** $1\frac{1}{2}$

Dividing Mixed Numbers. **1A.** $1\frac{1}{2}$ **2A.** 8 **3A.** 4 **4A.** $1\frac{31}{11}$

1B. $3\frac{1}{8}$ **2B.** 11 **3B.** 8 **4B.** $1\frac{1}{2}$ **1C.** $3\frac{1}{3}$ **2C.** 5 **3C.** 175 **4C.** $281\frac{1}{4}$

PAGE 210. — Adding Decimals. **1.** 39.968 **2.** 4.576 **3.** 3.833 **4.** 62.05 **5.** 42.92 **6.** 2.5 **7.** .916 **8.** 203.156 **9.** 37.74 **10.** 300.394

Subtracting Decimals. **1.** 38.655 **2.** 5.66 **3.** 6.86 **4.** 4.833 **5.** 67.47 **6.** 8.34 **7.** 226.885 **8.** 199.8 **9.** 198.05 **10.** 27.42

PAGE 211. — Problems. **1.** 12 **2.** August; 1.41 inches **3.** 224; $8.21 **4.** 57¢ **5.** $833.33; $27.39

General Practice. **1.** $\frac{23}{60}$ **2.** $121\frac{1}{24}$ **3.** $\frac{1}{12}$ **4.** $4\frac{4}{21}$ **5.** $12\frac{11}{24}$ **6.** $8\frac{13}{24}$ **7.** $12\frac{4}{5}$ **8.** $\frac{1}{36}$ **9.** 38.202 **10.** 399.08 **11.** 3001 **12.** $6.42

PAGE 220. — **1A.** .0567 **2A.** 1504 **3A.** 5.6 **4A.** 2.30 **5A.** .1880 **1B.** .32 **2B.** 81.32 **3B.** 5.32 **4B.** 3.6 **5B.** .413 **1C.** 156.275 **2C.** 42 **3C.** .11248 **4C.** 188,256 **5C.** .100572 **1.** Yes; no; 3.42 **2.** $147.50 **3.** $.70 **4.** 318.6 miles **5.** Less; correct answer is 24.598. **6.** 468.75 pounds **7.** 1208.75 **8.** 609.375 **9.** $3649.875 **10.** 108.3852 inches

PAGE 223. — **1.** $4.00 **2.** $2.40 **3.** $2.98 **4.** $3.60 **5.** $27.50 **6.** $24.50 **7.** $65 **8.** $2 **9.** $150 **10.** $5

PAGE 225. — **1A.** $\frac{1}{4}$ **2A.** $\frac{1}{2}$ **3A.** $\frac{1}{5}$ **4A.** $\frac{1}{6}$ **1B.** $\frac{7}{8}$ **2B.** $\frac{3}{4}$ **3B.** $\frac{1}{3}$ **4B.** $\frac{2}{5}$ **1C.** $\frac{3}{5}$ **2C.** $\frac{5}{6}$ **3C.** $\frac{1}{8}$ **4C.** $\frac{2}{3}$ **1D.** $\frac{29}{50}$ **2D.** $\frac{1}{7}$ **3D.** $\frac{5}{8}$ **4D.** $\frac{11}{12}$ **1E.** $\frac{1}{12}$ **2E.** $\frac{4}{5}$ **3E.** $\frac{5}{12}$ **4E.** $\frac{3}{8}$ **1F.** $\frac{1}{5}$ **2F.** $\frac{2}{7}$ **3F.** $\frac{2}{9}$ **4F.** $\frac{7}{12}$ **1G.** $\frac{1}{9}$ **2G.** $\frac{2}{5}$ **3G.** $\frac{5}{12}$ **4G.** $\frac{3}{7}$

PAGE 226. — **1.** 2159 **2.** 37,743 **3.** 12,528 **4.** $58\frac{7}{8}$ **5.** 30 **6.** .1517 **7.** 42.84 **8.** 8.168 **9.** $459\frac{15}{19}$ **10.** $\frac{3}{4}$ **11.** $\frac{3}{8}$ **12.** 12,798 **13.** $1\frac{1}{8}$ cups **14.** 9 **15.** 25¢

PAGE 233. — **1.** 36.5 **2.** 12.5, or $12\frac{1}{2}$; 14; country driving; 1.5, or $1\frac{1}{2}$, miles **3.** 196 pounds **4.** $72 **5.** 537.6 **6.** $56.25 **7.** 1.58 miles; 94.8 miles **8.** 400 **9.** 9 **10.** 10.5

PAGE 236. — **1.** 13.5¢, or $13\frac{1}{2}$¢, or $.135 **2.** $.11, or 11¢ **3.** $.065, or 6.5¢ **4.** $.12, or 12¢ **5.** $.0475, or 4.75¢, or $4\frac{3}{4}$¢ **6.** .85¢, or $.0085 **7.** 32.46 **8.** $.0495, or 4.95¢, or $4\frac{19}{20}$¢

PAGE 238. — **1.** $1292\frac{28}{29}$ **2.** $12\frac{10}{21}$ **3.** 95,410 **4.** $21\frac{1}{5}$ **5.** $3788\frac{2}{17}$ **6.** $24\frac{1}{12}$ **7.** 431.839 **8.** 267,995 **9.** 1344; 148 **10.** 11:18 A.M. **11.** $156.25 **12.** $15,405 **13.** $3.37\frac{1}{2}$ **14.** $105 **15.** $.28, or 28¢

PAGE 239. — **1A.** .1 **2A.** .07 **3A.** .245 **4A.** .4 **1B.** .315 **2B.** .2 **3B.** .19 **4B.** .018 **1C.** .5 **2C.** .005 **3C.** .3

4C. .072 **1D.** .009 **2D.** .6 **3D.** .04 **4D.** .9 **1E.** .8 **2E.** .95 **3E.** .7 **4E.** .008

PAGE 242. — **1A.** .25 **2A.** .8 **3A.** .125 **4A.** .5 **5A.** $.166\frac{2}{3}$ **6A.** $.6666\frac{2}{3}$ **7A.** $.0833\frac{1}{3}$ **1B.** $.4166\frac{2}{3}$ **2B.** .2 **3B.** .0625 **4B.** .375 **5B.** $.3333\frac{1}{3}$ **6B.** $.8333\frac{1}{3}$ **7B.** .4375 **1C.** .8125 **2C.** $.5833\frac{1}{3}$ **3C.** .4 **4C.** .1875 **5C.** .625 **6C.** .5625 **7C.** .7 **1D.** .75 **2D.** .9375 **3D.** $.9166\frac{2}{3}$ **4D.** .6 **5D.** .3125 **6D.** .875 **7D.** .6875

PAGE 243. — **1A.** 38.75 **2A.** 32.666 **3A.** 28.25 **4A.** 502.333 **1B.** 205.937 **2B.** 82.333 **3B.** 305.583 **4B.** 72.75

PAGE 244. — **1.** $23\frac{3}{40}$ **2.** 242,406 **3.** $1.75 **4.** 6 lb. 8 oz. **5.** $106.74 **6.** $\frac{7}{8}$ **7.** .375 **8.** 9.10 **9.** $2.90 **10.** $6 **11.** $9.31 **12.** Yes **13.** December; $19\frac{1}{2}¢$ **14.** 90 **15.** $\frac{7}{12}$ yd., more; $\frac{1}{36}$ yd.

PAGE 249. — **1.** 10 hours, 30 minutes; 42 hours **2.** 835 **3.** $1637\frac{1}{2}$ bushels, or 1637 bushels, 2 pecks **4.** 116 yards, 2 feet **5.** 2 hours, 30 minutes

PAGE 250. — **1.** 2975 **2.** 55,889 **3.** $510,446 **4.** 699,248 **5.** $1\frac{5}{24}$ **6.** $\frac{1}{4}$ **7.** $99\frac{2}{5}$ **8.** $\$248\frac{1}{19}$ **9.** 836.537 **10.** 205.686 **11.** $135\frac{5}{37}$ **12.** 37,203 **13.** 17.2 **14.** 2 for 15¢; $\frac{5}{6}¢$ **15.** $.055

PAGE 251. — **1.** 23 **2.** 35 **3.** 1065 **4.** 38 **5.** 452 **6.** 4240 **7.** 68 **8.** 740 **9.** 390 **10.** 77 **11.** 109 yd. 2 ft. **12.** 19 gal. 2 qt. **13.** 5 min. 42 sec. **14.** 7 wk. 3 da. **15.** 2 sq. ft. 117 sq. in. **16.** 2 T. 572 lb. **17.** 12 doz. 5 things **18.** 1 mi. 180 rd. **19.** 16 lb. 2 oz. **20.** 9 ft. 7 in.

PAGE 254. — **1.** 68,172 **2.** 1657.507 **3.** 32 **4.** 805 **5.** $\frac{5}{6}$ **6.** 1831.8 **7.** $\frac{7}{8}$ **8.** 92 **9.** 554.43 **10.** 78.26 **11.** 2247 **12.** $227\frac{1}{49}$ **13.** $5.92 **14.** 512 miles **15.** $23\frac{7}{16}$

PAGE 255.—Addition Practice. **1.** 7283 **2.** 7322 **3.** 8579 **4.** 10,069 **5.** 5622 **6.** 4692

Problems. **1.** 1 foot **2.** 55 **3.** Each piece should be 3 feet, 7 inches long. **4.** 2 bushels, 2 pecks **5.** 14

PAGE 257. — **1.** 7489 **2.** $783,288 **3.** 34,043 **4.** $205 **5.** $\frac{7}{9}$ **6.** 1.0314 **7.** 908 inches **8.** 2.807 **9.** 6 hours, 20 minutes **10.** 198 **11.** 1287 **12.** Two hundred and fifty-three thousandths is more; 199.8 more **13.** 12 **14.** 58 hours, 15 minutes **15.** 8:58:25 A.M. same day

PAGE 267. — **1A.** 7771 **2A.** 67,556 **3A.** 260,959 **4A.** 21,888 **1B.** 7741 **2B.** 51,889 **3B.** 89,859 **4B.** 6098 **1C.** 47,230 **2C.** 44,475 **3C.** 808,611 **4C.** 59,782

PAGE 270. — **1.** 41,717 **2.** 1849.4 **3.** $57\frac{7}{9}$ **4.** 4828

5. $91\frac{14}{15}$ **6.** $2\frac{1}{2}$ **7.** 1.11945 **8.** $6\frac{2}{21}$ **9.** Room is larger; no; rug is too long. **10.** 4¢, 25¢, $1, $5 **11.** 2¢, 50¢, $3, $5; or 2¢, 5¢, 10¢, 10¢, 25¢, $3, $5 **12.** $386.47 **13.** $2.16 **14.** 35 **15.** $5.37

PAGE 276. — **1.** 3.58 **2.** 20 **3.** .127 **4.** 500 **5.** .015 **6.** 2.4 **7.** 10,000 **8.** 1,000,000 **9.** 1500 **10.** 4.9

PAGE 277. — **1.** 6086 **2.** 318,875 **3.** 606.875 **4.** 97.3350, or 97.335 **5.** $25\frac{20}{21}$ **6.** $17\frac{2}{9}$ **7.** $18{,}327\frac{1}{13}$ **8.** 5 ft. 10 in. **9.** A 9-foot square is larger; 72 square feet larger **10.** A 12-inch square is larger; 132 square inches larger **11.** 40; 320 **12.** 1; 322 **13.** The field described in problem 11 has the greater area, in problem 12 the greater perimeter. **14.** 6,303,387

PAGE 284. — **1A.** 59.4 **2A.** 110 **3A.** 5.04 **1B.** 60 **2B.** 130 **3B.** 14.6 **1C.** 160 **2C.** 73.7 **3C.** 75.3 **1D.** 14 **2D.** 40 **3D.** 24.44 **1E.** 490 **2E.** 350 **3E.** 76.8 **1F.** 108 **2F.** 100 **3F.** 15 **1G.** 13.05 **2G.** 97.65 **3G.** 57.77 **1H.** 58.33 **2H.** 320 **3H.** 90 **1I.** 36.86 **2I.** 700 **3I.** 45 **1J.** 39.95 **2J.** 500 **3J.** 15.13

PAGE 285. — **1.** 4 **2.** 6 **3.** 8 **4.** 16 **5.** 4 **6.** 2 **7.** 36 **8.** 34 **9.** 36 **10.** 38 **11.** 32

PAGE 286. — Practice in Multiplying Denominate Numbers. **1.** 15 ft. 9 in. **2.** 34 lb. 8 oz. **3.** 33 min. 45 sec. **4.** 8 gal. 1 qt. **5.** 11 sq. ft. 48 sq. in. **6.** 122 bu. 2 pk. **7.** 11 mo. **8.** 34 hr. 30 min. **9.** 529 ft. 4 in. **10.** 4600

General Practice. **1.** $1\frac{55}{31}$ **2.** 5664 **3.** $10\frac{13}{21}$ **4.** $49\frac{11}{21}$ **5.** 298.44 **6.** .664 **7.** $24\frac{3}{4}$ **8.** 2.0889 **9.** 5280 **10.** 15 **11.** 36 **12** .325 **13.** 14 months **14.** $28.80 **15.** $164.70

PAGE 288. — **1.** 826 **2.** 750 **3.** Longfellow School; 76 more

PAGE 290. — Buying an Automobile Tire. **1.** $30.50 **2.** $30.60 **3.** $25.20 **4.** $25.00 **5.** $28.00 **6.** $29.20 **7.** Rush Auto Supply House

Practice in Dividing Denominate Numbers. **1.** 5 lb. 12 oz. **2.** 2 ft. 9 in. **3.** 4 min. 17 sec. **4.** 791 bu. 3 pk. **5.** 22 gal. 3 qt. **6.** 2 hr. 12 min. **7.** 2 T. 1920 lb. **8.** 100 sq. in. **9.** 1 A. $91\frac{1}{5}$ sq. rd. **10.** 6 ft. $11\frac{1}{3}$ in.

PAGE 291. — **1.** 112,613 **2.** 10,441 **3.** $2384\frac{10}{27}$ **4.** 377,143 **5.** $36\frac{5}{6}$ **6.** 3.690, or 3.69 **8.** $29\frac{5}{12}$ **9.** 41.74 inches **10.** 11 pounds, 10 ounces **11.** 24 bushels, 3 pecks **12.** $5\frac{1}{3}$ **13.** 75¢ **14.** 15 feet, or 5 yards **15.** 107.76

PAGE 293. — **1A.** 2.5 **2A.** 3.6 **3A.** 12.15 **1B.** 39.65 **2B.** 24.92 **3B.** 45 **1C.** 42.14 **2C.** 32 **3C.** 10.22

1. 135, first grade; 126, second grade; 135, third grade; 72, eighth grade; 72, ninth grade; 90, fourth grade; 90, fifth grade; 90, sixth grade; and 90, seventh grade **2.** $3600 to each daughter; $2400 to each son **3.** 10, 18, 12

PAGE 294. — **1A.** 100 **2A.** 100 **3A.** 100 **1B.** 90 **2B.** 90 **3B.** 90 **1C.** 175 **2C.** 175 **3C.** 175 **1D.** 133 **2D.** 133 **3D.** 133 **1E.** 48 **2E.** 48 **3E.** 48 **1F.** 115.50 **2F.** 115.50 **3F.** 115.50 **1G.** 54 **2G.** 54 **3G.** 54 **1H.** 88 **2H.** 88 **3H.** 88 **1I.** 77 **2I.** 77 **3I.** 77 **1J.** 49 **2J.** 49 **3J.** 49

PAGE 296. — **1A.** 50 **2A.** $12\frac{1}{2}$ **1B.** $33\frac{1}{3}$ **2B.** 75 **1C.** $16\frac{2}{3}$ **2C.** 60 **1D.** 25 **2D.** $83\frac{1}{3}$ **1E.** 20 **2E.** 65

1. 25 **2.** 50 **3.** 75 **4.** 20 **5.** 25 **6.** 50 **7.** 25 **8.** 20 **9.** 25 **10.** 75

PAGE 297. — **1.** $79.80 **2.** $21\frac{11}{15}$ **3.** 7733 **4.** .86 **5.** 11 ft. 11 in. **6.** 338,310 **7.** 125 ounces **8.** 58,097 **9.** $37.50; $38.06 **10.** $12.89 **11.** James; 5¢ more **12.** 75¢ **13.** $7.05 **14.** 5 ft. 8 in. **15.** $8.50

PAGE 301. — **1A.** 21 **2A.** 26 **3A.** 98 **4A.** 96 **5A.** 101 **6A.** 27 **1B.** 550 **2B.** 87 **3B.** 793 **4B.** 90 **5B.** 207 **6B.** 731 **1C.** 137 **2C.** 98 **3C.** 99 **4C.** 80 **5C.** 419 **6C.** 658 **1D.** 758 **2D.** 953 **3D.** 831 **4D.** 1677 **5D.** 13,492 **6D.** 173,592

PAGE 302. — **1A.** 12 **2A.** 45 **3A.** 81 **4A.** 40 **5A.** 26 **6A.** 37 **1B.** 67 **2B.** 89 **3B.** 217 **4B.** 553 **5B.** 221 **6B.** 75 **1C.** 342 **2C.** 257 **3C.** 634 **4C.** 101 **5C.** 70 **6C.** 521 **1D.** 303 **2D.** 444 **3D.** 5398 **4D.** 2799 **5D.** 110 **6D.** 898 **1E.** 1305 **2E.** 349,469 **3E.** 46,887 **4E.** 275,689 **5E.** 66,669 **6E.** 388,597

PAGE 303. — Practice Test in Multiplication. **1A.** 3285 **2A.** 29,736 **3A.** 118,734 **4A.** 238,400 **5A.** 248,436 **6A.** 227,700 **1B.** 504,866 **2B.** 588,720 **3B.** 14,882 **4B.** 2,462,330 **5B.** 3,141,500 **6B.** 1,252,845 **1C.** 1,125,436 **2C.** 5,843,530 **3C.** 12,454,260 **4C.** 37,364,180 **5C.** 20,705,025 **6C.** 25,256,800

Practice Test in Long Division. **1A.** $70\frac{6}{8}\frac{6}{3}$ **2A.** 29 **3A.** 80 **1B.** 18 **2B.** 79 **3B.** 54 **1C.** 720 **2C.** 507 **3C.** 285

PAGE 305. — **1A.** $1\frac{5}{12}$ **2A.** $\frac{1}{20}$ **3A.** $\frac{1}{6}$ **4A.** $30\frac{5}{12}$ **1B.** $1\frac{1}{2}$ **2B.** $1\frac{5}{24}$ **3B.** $\frac{7}{8}$ **4B.** $6\frac{4}{9}$ **1C.** $\frac{9}{80}$ **2C.** $\frac{1}{12}$ **3C.** $1\frac{1}{15}$ **4C.** $2\frac{1}{2}$ **1D.** 10 **2D.** 10 **3D.** $23\frac{11}{12}$ **4D.** $\frac{3}{4}$ **1E.** $\frac{7}{9}$ **2E.** $10\frac{3}{4}$ **3E.** $10\frac{1}{8}$ **4E.** $2\frac{1}{2}$

PAGE 306. — **1A.** 56.4 **2A.** .2236 **3A.** .2622 **4A.** 18.647

1B. 55.68 **2B.** 11.40 **3B.** 31.96 **4B.** 1.674 **1C.** 2.5536 **2C.** .423 **3C.** 26.88 **4C.** 6.912 **1D.** 2.328 **2D.** .3381 **3D.** .1003 **4D.** .383968

PAGE 307. — Practice Test in Dividing Decimals. **1A.** .4 **2A.** 46 **3A.** 42 **4A.** .57 **1B.** .036 **2B.** .21 **3B.** 630 **4B.** .0064 **1C.** 2.7 **2C.** 320 **3C.** 5.9 **4C.** 542.5 **1D.** .16 **2D.** 5000 **3D.** 46 **4D.** 605

Practice Test in Multiplying Denominate Numbers. **1A.** 43 lb. 8 oz. **2A.** 50 ft. **3A.** 45 qt. **1B.** 23 gal. **2B.** 40 bu. 1 pk. **3B.** 66 lb. **1C.** 33 ft. 6 in. **2C.** 22 qt. 1 pt. **3C.** 149 min., or 2 hr. 29 min. **1D.** 43 bu. 3 pk. **2D.** 46 gal. 1 qt. **3D.** 205 min. 6 sec., or 3 hr. 25 min. 6 sec.

PAGE 308. — **1.** 2.01×8.12 is larger. First answer is less than 15; second answer is more than 16. **2.** $23.80 per 1000 is cheaper; $.0007, or .07¢, cheaper **3.** $1.35 **4.** 19 **5.** $62\frac{1}{2}$ **6.** 300 **7.** $109.38 **8.** 39.7 **9.** 15.88 **10.** 53¢ **11.** $62.75 **12.** $26\frac{1}{4}$ bushels **13.** 18¢ **14.** 500 **15.** 52¢ **16.** 50 **17.** 32 **18.** 32.5 tons

PAGE 309. — **1A.** 4 ft. 5 in. **2A.** 4 bu. 1 pk. **3A.** 9 lb. 8 oz. **1B.** 9 min. 10 sec. **2B.** 1 yr. 9 mo. **3B.** 5 ft. 2 in. **1C.** 12 bu. 2 pk. **2C.** 2 wk. 4 da. **3C.** 1 wk. 3 da. **1D.** 8 min. 45 sec. **2D.** 1 yr. 6 mo. **3D.** 11 lb. 15 oz.

PAGE 310. — **1.** .07125 **2.** .734375 **3.** 400 **4.** 40 lb. 11 oz. **5.** 1 ft. 10 in. **6.** 5.73 **7.** 4.816 **8.** 4.293 **9.** .383 **10.** 5.96 **11.** .017 **12.** $147.00 **13.** $9.73 **14.** 52 bushels, 3 pecks **15.** $66\frac{2}{3}$

PAGE 312. — **1.** $21.25; $6.80; $2.98; $10.63; $6.38; $7.23; $1.28; $2.55; $2.13; $4.25; $8.50; $6.38; $11.80; $3.40; $10.20; $7.65; $12.75; $2.98; $5.10; $12.75 **2.** 32.5; 25; 37.5; $33\frac{1}{3}$; 40; 38.4; 42.8; 14.5; 20; 17.5; $6\frac{2}{3}$; 14.3; $13\frac{1}{3}$; 10; 18.2; $11\frac{1}{9}$; $18\frac{3}{4}$; $18\frac{3}{4}$; 25.7; 24

PAGE 314. — Chiffonier, $4.25, $80.75; stove, $5.25, $47.25; living room set, $80.70, $457.30; rug, $27.10, $108.40; piano, $237.50, $712.50; table, $6.37, $36.13; kitchen cabinet, $13.50, $121.50; refrigerator, $45, $180; dining room set, $19.30, $366.70; bedroom set, $116.87, $350.63

PAGE 315. — **1.** New York, 59.1; Cleveland, 57.1; Philadelphia, 55.3; Washington, 54; Chicago, 52.9; Detroit, 51.3; St. Louis, 40.3; Boston, 30.1 **2.** First grade, 19.3; second grade, 17.7; third grade, 16.9; fourth grade, 16.8; fifth grade, 15.2; sixth grade, 13.8

PAGE 316. — Practice in Adding Decimals. **1A.** 53.86 **2A.** 9.4

3A. 7.33 **4A.** 7.947 **1B.** 4.254 **2B.** 69.083 **3B.** 335.627 **4B.** 20.695 **5.** 9.0404 **6.** 395.05 **7.** 676.54 **8.** 9.157 **9.** 210.617

Practice in Subtracting Decimals. **1A.** 33.947 **2A.** 10.898 **3A.** 1.958 **4A.** 6.251 **1B.** 714.9 **2B.** 198.24 **3B.** 24.69 **4B.** 52.37

PAGE 318. — **1.** $267.40, discount; $534.80, amount company has to pay **2.** $280; $70; $210

PAGE 319. — **1.** $12\frac{1}{8}$ **2.** $10\frac{1}{3}$ **3.** 360 **4.** $7109 **5.** 13 bu. 1 pk. **6.** 22.12 **7.** 1.3122 **8.** $2\frac{1}{4}$ **9.** Helen, 9; John, 2; Margaret, 1; Arthur, 10; Henry, 4; Jean, 5; James, 7 **10.** 2¢, 10¢, 25¢, $4 **11.** 332 **12.** 200 **13.** $1.40 **14.** $3.24 **15.** 5 minutes, $6\frac{2}{15}$ seconds

PAGE 321. — **1.** 3 ft. 7 in. **2.** 4 lb. 12 oz. **3.** 1 bu. 2 pk. **4.** 3 gal. 2 qt. **5.** 4 mo. 22 da. **6.** 2 T. 900 lb. **7.** 22 min. 11 sec.

PAGE 323. — **1.** Amount of bill, $273.90; trade discount, $68.47; cash discount, $4.11; net amount, $201.32 **2.** $311.96, trade discount; $24.96, cash discount; $935.89; $910.93

PAGE 324. — **1.** $4\frac{4}{8}\frac{3}{4}$ **2.** 220.812 **3.** 4 lb. 9 oz. **4.** 3000 **5.** $2\frac{4}{3}\frac{}{3}$ **6.** 295 ounces **7.** 30,301 **8.** $2\frac{2}{3}\frac{5}{2}$ **9.** Nine hundred thousandths is more; .89991 more **10.** 3 for a dime is cheaper; $\frac{5}{2}\frac{}{1}$¢ **11.** 10 **12.** $38.25 **13.** 200 rods; 160 rods; 40 rods; yes **14.** A 5-foot square is more; 20 square feet more **15.** $16\frac{2}{3}$

PAGE 327. — **1.** 2354 **2.** Las Vegas **3.** More **4.** 1636 **5.** Dodge City to Williams; 42 miles **6.** 67; 2 days, 19 hours **7.** Sunday **8.** $32\frac{1}{2}$ hours; 1 day, $8\frac{1}{2}$ hours **9.** Saturday; 35

1A. 4484 **2A.** 32,946 **3A.** 522,375 **4A.** 659,110 **1B.** 4,513,235 **2B.** 2,957,600 **3B.** 17,818,692 **4B.** 295,757,951 **1C.** 1,652,805 **2C.** 623,520 **3C.** 412,641 **4C.** 5,627,935

PAGE 329. — $121.50; $280; $500; $840; $1050; $1925

1A. $5\frac{1}{3}$ **2A.** $\frac{5}{2}\frac{}{4}$ **3A.** $\frac{1}{1}\frac{5}{7}\frac{}{6}$ **1B.** $\frac{5}{8}\frac{}{4}$ **2B.** $9\frac{3}{5}$ **3B.** $1\frac{5}{7}$ **1C.** $\frac{2}{9}$ **2C.** $\frac{7}{8}$ **3C.** $\frac{6}{7}$

PAGE 330. — **1.** 3528 **2.** 2.80650, or 2.8065 **3.** 4 lb. 11 oz. **4.** 2040 **5.** $14\frac{2}{3}$ **6.** $40\frac{1}{2}\frac{7}{0}$ **7.** $210 **8.** 33.929 **9.** $5600 **10.** $196.10 **11.** $\frac{3}{8}$ of a pound is more; 2 ounces more **12.** $9.19 **13.** 321 pounds, 10 ounces **14.** 17 **15.** 64.9

PAGE 336. — **1.** 26.367 **2.** 378.37 **3.** 91.782 **4.** 18.866 **5.** 431.1 **6.** 139.373 **7.** 1.407 **8.** 50.79 **9.** 613.92

PAGE 337. — **1A.** 21 lb. 12 oz. **2A.** 142 bu. **3A.** 110 ft., or 36 yd. 2 ft. **1B.** 165 yd. 2 ft. **2B.** 60 hr. 9 min., or 2 da.

12 hr. 9 min. **3B.** 26 ft. 3 in., or 8 yd. 2 ft. 3 in. **1C.** 75 gal. **2C.** 67 min., or 1 hr. 7 min. **3C.** 292 qt. 1 pt., or 73 gal. 1 pt. **1D.** 84 yd. **2D.** 15 lb. **3D.** 250 hr., or 10 da. 10 hr. **1E.** 28 bu. 2 pk. **2E.** 19 gal. 1 qt. **3E.** 55 min. 21 sec.

PAGE 340. — **1.** 12 lb. 7 oz. **2.** 326 lb. **3.** $17\frac{17}{40}$ **4.** 19,907 **5.** 4.7808 **6.** $49.89 **7.** $71\frac{13}{24}$ **8.** 21.6 **9.** 4 **10.** 128; 2 **11.** $11.95 **12.** $2.22 **13.** $5.90; nickel, dime, quarter, half dollar, five-dollar bill **14.** Dick **15.** $703.45

PAGE 343. — **1A.** 62 **2A.** 386 **3A.** $175\frac{43}{432}$ **1B.** 847 **2B.** 67 **3B.** 2004 **1C.** 328 **2C.** 97 **3C.** 307 **1D.** 509 **2D.** 89 **3D.** $1263\frac{35}{62}$

PAGE 346. — **1.** 10.412 **2.** 406 **3.** 24 ft. **4.** 3.603 **5.** 30.0424 **6.** 12 lb. 9 oz. **7.** $2\frac{38}{81}$ **8.** $21.59 **9.** $40' \times 100'$; yes **10.** $49.51 **11.** $705.60 **12.** $9\frac{1}{3}$ **13.** $.07875, or $7\frac{7}{8}$¢

PAGE 349. — **1.** 43,905 **2.** $3\frac{3}{32}$ **3.** $\frac{7}{8}$ **4.** 396 ft. 4 in. **5.** $35.825 **6.** 65 lb. 13 oz. **7.** 4.524 **8.** 144 **9.** 31.18464 common miles **10.** 1 twenty-dollar bill, 4 one-dollar bills, 1 half dollar, 1 quarter, 1 dime, 1 nickel, and 3 cents; 1 twenty-dollar bill, 1 ten-dollar bill, 1 five-dollar bill, 2 one-dollar bills, 1 half dollar, 1 dime, and 1 nickel; 1 ten-dollar bill, 1 five-dollar bill, 3 one-dollar bills, 1 half dollar, 1 quarter, 2 dimes, 4 cents **11.** 3 **12.** 1 cent, 1 dime, 2 one-dollar bills, and 1 five-dollar bill

PAGE 355. — **1A.** 1.48 **2A.** 800 **3A.** 320 **1B.** .5 **2B.** .52 **3B.** .05 **1C.** 20 **2C.** .008 **3C.** 5.120+ **1D.** 1 **2D.** .7 **3D.** .9 **1E.** 16,530.303+ **2E.** 50 **3E.** 1.8

PAGE 356. — **1.** $.25 **2.** $.20 **3.** $.25 **4.** $.75 **5.** $.50 **6.** $1.65 **7.** $2.35

PAGE 357. — Nov. 1, $.35; Nov. 2, $1.60; Nov. 3, $1.75; Nov. 6, $2.57; Nov. 10, $2.94; Nov. 13, $3.94; Nov. 14, $4.39; Nov. 17, $5.26; Nov. 20, $5.88; Nov. 24, $6.27; Nov. 30, $7.22

PAGE 358. — **1.** $4.27 **2.** $3.95 **3.** $2.45

PAGE 359. — **1.** 8.573 **2.** $11\frac{9}{16}$ **3.** $5,190,729 **4.** .531+ **5.** $10\frac{7}{8}$ **6.** 356.07 **7.** 284,119 **8.** .057+ **9.** 8 hours, 15 minutes **10.** $5 **11.** 64.5 **12.** 592.9 miles **13.** 22.875 **14.** 2 cents, 1 dime, 1 quarter, 1 half dollar, 2 one-dollar bills **15.** 385.85+

PAGE 361. — **1A.** $\frac{39}{80}$ **2A.** $2\frac{7}{8}$ **3A.** $\frac{7}{27}$ **4A.** $\frac{6}{11}$ **1B.** 24 **2B.** $\frac{7}{32}$ **3B.** $5\frac{1}{2}$ **4B.** $\frac{4}{7}$ **1C.** $\frac{2}{5}$ **2C.** $13\frac{1}{3}$ **3C.** $\frac{5}{8}$ **4C.** $5\frac{5}{7}$ **1D.** $\frac{2}{3}$ **2D.** $33\frac{3}{5}$ **3D.** $8\frac{5}{9}$ **4D.** $15\frac{3}{4}$

PAGE 362. — **1.** $\frac{1}{4}$ **2.** $\frac{1}{4}$ **3.** $\frac{3}{16}$ **4.** $\frac{1}{16}$ **5.** $\frac{1}{8}$ **6.** $\frac{1}{8}$ **7.** $600 **8.** $600 **9.** $450 **10.** $150 **11.** $300 **12.** $300

PAGE 363. — **1.** \$2.12; \$1.06; \$1.06 **2.** 30¢; 30¢; 15¢ **3.** \$6; \$18; \$3; \$3 **4.** Rent, \$50; clothes, \$40; insurance, \$10; food, \$40; heat and light, \$10; savings, \$30; amusements and charity, \$20

PAGE 364. — **1.** $\frac{1}{4}\frac{3}{8}$ **2.** $\frac{1}{8}\frac{5}{1}$ **3.** $\frac{9}{16}$ **4.** 3.4110, or 3.411 **5.** \$2761 **6.** 38.726 **7.** 108,000 **8.** 10 ft. 4 in. **9.** 10 hr. 1 min. **10.** 4 pk. 4 qt. **11.** 25 **12.** $\frac{1}{2}$ **13.** 20 **14.** \$6.25 **15.** 4 miles; \$21,000; $\frac{2}{2}\frac{1}{6}$ mile

PAGE 368. — **1A.** \$15 **2A.** \$37.50 **1B.** \$45 **2B.** \$40 **1C.** \$60 **2C.** \$2 **1D.** \$1000 **2D.** \$175 **1E.** \$14.64 **2E.** \$2.50

PAGE 369. — **1.** \$6 **2.** \$3.33 **3.** \$26.67 **4.** \$.40 **5.** \$1.40 **6.** \$2.44 **7.** \$48.75 **8.** \$1.35 **9.** \$1.75 **10.** \$3.50 **11.** \$.83 **12.** \$.20 **13.** \$2.33 **14.** \$50.00 **15.** \$7.50 **16.** \$25.71

PAGE 370. — **1.** 50¢ **2.** 7¢ **3.** 5¢ **4.** 1¢ **5.** 2¢ **6.** 3¢ **7.** 68¢

PAGE 371. — **1A.** 1 lb. 2 oz. **2A.** 9 qt. **3A.** 12 min. 4 sec. **1B.** 5 gal. 1 qt. **2B.** 5 yd. 2 ft. **3B.** 3 ft. 2 in. **1C.** 8 qt. 1 pt. **2C.** 34 yd. 1 ft. **3C.** 25 hr. 7 min., or 1 da. 1 hr. 7 min. **1D.** 18 bu. 1 pk. **2D.** 12 min. 23 sec. **3D.** 2 lb. 5 oz. **1E.** 4 ft. 7 in. **2E.** 3 gal. 2 qt. **3E.** 32 hr. 45 min., or 1 da. 8 hr. 45 min.

PAGE 372. — **1.** \$4.17 **2.** \$5.22 **3.** \$185 **4.** \$14.58 **5.** \$17.78 **6.** \$4.58 **7.** \$2.67 **8.** \$20.67 **9.** \$.83 **10.** \$.97

PAGE 373. — **1.** \$135 **2.** \$14 **3.** \$800 **4.** \$6875 **5.** \$20 **6.** \$50 **7.** \$82 **8.** \$900 **9.** \$3350 **10.** \$10.40

PAGE 378. — Practice in Finding Area of Right Triangles. **1.** 6 sq. ft. **2.** 5 sq. in. **3.** 9 sq. in. **4.** 10 sq. ft. **5.** 7 sq. ft. **6.** 18 sq. yd. **7.** 20 sq. ft. **8.** 27 sq. in. **9.** 28 sq. in. **10.** 12 sq. yd.

General Practice. **1.** 502 **2.** 8459 **3.** .4650, or .465 **4.** 7 lb. 11 oz. **5.** 223 **6.** $7\frac{1}{3}\frac{9}{5}$ **7.** $31\frac{1}{2}\frac{7}{4}$ **8.** .90625 **9.** \$330 **10.** $56\frac{1}{4}$ miles **11.** Yes **12.** Yes **13.** 45.4 **14.** $131\frac{5}{1}\frac{}{6}$ pounds, or 131 pounds, 5 ounces **15.** 14¢ (nearly)

PAGE 381. — **1.** 8 sq. in. **2.** 15 sq. ft. **3.** 42 sq. ft. **4.** 40 sq. ft. **5.** 6 sq. yd. **6.** 96 sq. in. **7.** 45 sq. ft. **8.** 24 sq. yd. **9.** 21 sq. in. **10.** 20 sq. ft.

1A. 2 ft. 6 in. **2A.** 2 bu. 1 pk. **1B.** 2 lb. 8 oz. **2B.** 9 min. 3 sec. **1C.** 6 qt. 1 pt. **2C.** 14 yd. 1 ft. **1D.** 9 hr. 16 min. **2D.** 12 gal. 3 qt.

PAGE 382. — **1.** 113; 27 lb. 5 oz. **2.** 334 **3.** $\frac{3}{4}$ **4.** $23.1\frac{1}{2}$

5. $72\frac{1}{12}$ **6.** 4312.5 **7.** 14 lb. 2 oz. **8.** .273 **9.** 4.2 **10.** $20' \times 80'$, greater perimeter; yes **11.** 20% off; 14¢ **12.** Better to buy case; save 24¢ **13.** 35 **14.** 33.9 **15.** 198

PAGE 384. — **1.** 3 sq. in. **2.** 10 sq. ft. **3.** $17\frac{1}{2}$ sq. in. **4.** 16 sq. yd. **5.** 21 sq. ft. **6.** 18 sq. yd. **7.** 9 sq. i **8.** 28 sq. ft. **9.** 35 sq. in. **10.** 6 sq. ft. **11.** 20 sq. ft. **12.** 48 sq. in. **13.** 6400 sq. rd. n.

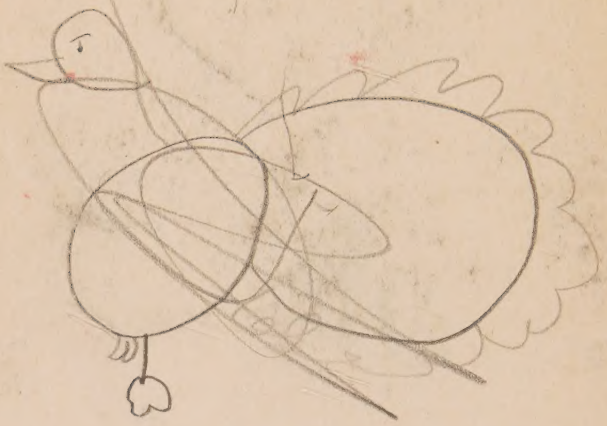
PAGE 385. — **1.** 1185 rd.; 26 lb. 9 oz.; 26 ft. 4 in. **2.** $2\frac{53}{120}$ **3.** .578125 **4.** $42.6395 **5.** $56.25 **6.** $42\frac{3}{4}$ **7.** 16 lb. 15 oz. **8.** $3.89 **9.** 13 **10.** $\frac{454}{1651}$, or .275 **11.** $4\frac{1}{4}$ pounds **12.** 20 **13.** $8.50 **14.** $36.26 **15.** 24.9%

PAGE 388. — **1.** 1440 **2.** 384 **3.** $10\frac{1}{2}$ **4.** 60 **5.** 144

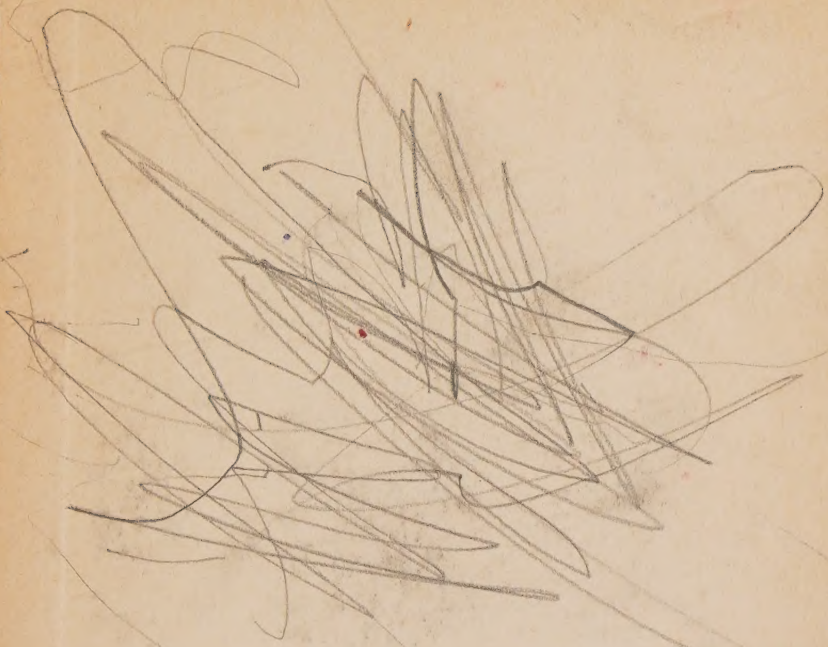
PAGE 390. — **1.** $1\frac{7}{9}$ **2.** $1\frac{1}{8}$ **3.** 1944 **4.** $6\frac{3}{4}$ **5.** $6\frac{59}{77}$, or 6.65 (nearly)

1A. 675 **2A.** 5100 **3A.** .18 **4A.** 5000 **1B.** 1.5 **2B.** .012 **3B.** .9 **4B.** 80

PAGE 392. — **1.** 108 **2.** 240 **3.** 2500 trips; 250 for each truck **4.** $1687\frac{1}{2}$ **5.** 1350



MRS. SOMB
IS A?



01

Contract Price	$ .48
Exchange Price	.45

The price marked hereon is fixed by the State, and any deviation therefrom should be reported to the State Superintendent of Public Instruction.